# Terrestrial Biodiversity Assessment

## FE Tango Wind Energy Facility (Aberdeen)

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Author: J. Pote

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Compiled by: **Jamie Pote** (Pr. Sci. Nat.)
Postnet Suite 57, Private Bag X13130, Humewood, Port Elizabeth, 6013, South Africa
jamiepote@live.co.za +27 (0)76 888 9890

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Revised Draft Report



## Revisions

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# 1 Introduction & Background

## 1.1 Background

Savannah Environmental has been appointed to undertake the relevant environmental applications for the development of a WEF (Wind Energy Facility) located between **Beaufort West to the north-west and Aberdeen to the south-east, in the Eastern Cape** province. This report is the terrestrial Biodiversity Assessment pertaining to the FE Tango Wind Energy Facility site, to assess risks to the proposed project.

## 1.2 Purpose of Report

The purpose of this report is to undertake and ecological and biodiversity screening of the site to determine the condition of the remnant natural vegetation and to inform environmental requirements of the proposed project.

- This screening report has been compiled with reference to the reporting requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020.** This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.
- This screening report also addresses the requirements in terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal (species) themes.**

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development.

### 1.2.1 Report Structure

This report has been structured and written to provide background information relating to the various topics, primarily for the unfamiliar reader. Specific observations and analyses of the project in relation to the various topic are indicated in green text. Text boxes at the end of each section summarise the implications of the aspect under consideration in relation to the specific project. Summary information tables are provided, including a synopsis of applicable regional planning aspects (Table 1). A general description of the systematic conservation planning components is provided in Appendix D: Systematic Conservation Planning for reference purposes.

## 1.3 Project Description

### 1.3.1 Activity Location and Description

FE Tango (Pty) Ltd is proposing the development of a wind energy facility and associated infrastructure on a site located approximately 20 km west of Aberdeen in the Eastern Cape Province (Figure 1). The project is located within the Dr Beyers Naude Local Municipality and the greater Sarah Baartman District Municipality. The project site comprises a single affected property, Portion 1 of Farm Klipstavel 72. The project is known as the FE Tango Wind Energy Facility. The project is planned as part of a cluster of

renewable energy projects, which includes a second facility, FE Kudu Wind Energy Facility, located approximately 20 km to the west of the site.

The entire extent of the site falls within the Beaufort West Renewable Energy Development Zones (i.e. REDZ Focus Area 11). The undertaking of a basic assessment process for the project is in line with the requirements stated in GNR 114 of 16 February 2018.

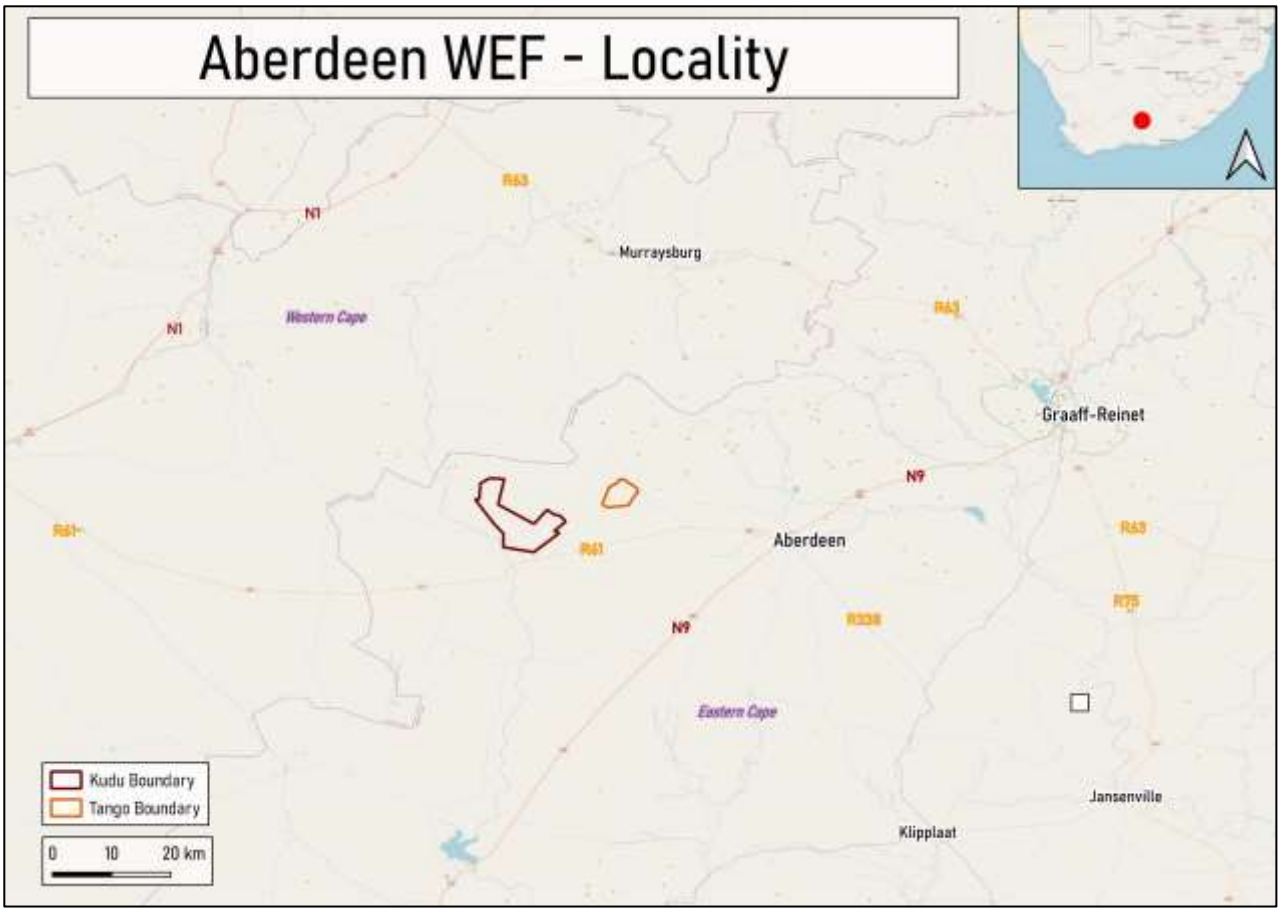


*Figure 1: Site location comprised of commercial farmland with predominantly natural vegetation but with cultivated lands in the surrounding area.*

The FE Tango Wind Energy Facility will have a contracted capacity of up to 150 MW and comprise wind turbines with a capacity of up to 7.5 MW each. The project has a preferred project site of approximately ~2 250 Ha. Access to the site will be via an existing road off of the nearby R61. The FE Tango Wind Energy Facility project site is proposed to accommodate the following infrastructure:

- Up to 18 wind turbines, turbine foundations and turbine hardstands
- An on-site substation hub incorporating:
  - A 132 kV on-site facility substation
  - Switchyard with collector infrastructure
  - Battery Energy Storage System (BESS)
  - Operation and Maintenance buildings
- A balance of plant area incorporating:
  - Temporary laydown areas
  - A construction camp laydown and temporary concrete batching plant

- Power lines internal to the wind farm, trenched and located adjacent to internal access roads, where feasible.
- Access roads to the site and between project components with a width up to 8 m for primary access routes.

A technically viable development footprint was proposed by the developer and assessed as part of the studies. The details of the project are as follows:

| | |
|---|---|
| **Project Name** | FE Tango Wind Energy Facility |
| **Location** | Portion 1 of Farm Klipstavel 72 |
| **Applicant** | FE Tango (Pty) Ltd |
| **Contracted capacity** | Up to 150 MW (turbines up to 7.5 MW in capacity) |
| **Number of turbines** | Up to 18 turbines |
| **Turbine hub height** | Up to 164 m |
| **Turbine top tip height** | Up to 250 m |
| **Rotor swept area** | up to 21 000m$^2$ |
| **Capacity of on-site substation** | 132kV |
| **Area occupied by the on-site substation** | ~ 2 ha in extent |
| **Underground cabling** | Underground cabling, with a capacity of 33 kV, will be installed to connect the turbines to the on-site facility substation. |
| **Battery Energy Storage System (BESS)** | Solid state battery technology (e.g. Lithium-ion technology) as a preferred technology.<br>BESS will be housed in containers approximately 20 m long, 3 m wide, and 5 m high with an approximate footprint of up to 5 ha. |
| **Operation and maintenance (O&M) buildings** | ~ 1 ha in extent |
| **Balance of plant area** | Temporary laydown areas with an extent up to 6 ha.<br>Temporary warehouse of 1 ha<br>Temporary site camp establishment and concrete batching plants of 1 ha. |
| **Access and internal roads – Main Road** | Main access road to the site and between project components with a width up to 8 m and a servitude of 13.5 m. |
| **Access and internal roads – internal network** | Road network between project components with a width up to 8 m |
| **Turbine hardstand footprint** | For each turbine the following will be relevant:<br>~up to 7 500 m$^2$ for the turbine hardstand area |
| **Turbine foundation footprint** | ~ 1000 m$^2$ per turbine |

The project is intended to provide electricity to the national grid through the Department of Mineral Resource and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or other public or private off-taker programmes.

### 1.3.2 Aspects of the project that could potentially have Biodiversity related Impacts

The proposed project will require clearing of natural vegetation for the construction of the wind energy facility as well as infrastructure including access roads and grid connections (substation, BESS, and powerlines), as well as any construction areas and laydown areas.

## 1.4 Methodology and Approach

The preferred project footprint will be assessed, implementing the following approach:

1. Undertake a comprehensive desktop study to identify potential risks for terrestrial biodiversity inclusive of the national screening tool, relevant regional biodiversity planning frameworks, any previous studies as well as interrogation of applicable databases.
2. A single site visit to assess the following:
   a. Verification of findings of previous specialists.
   b. Broad level Field survey of vegetation, flora, and habitats present (including any riparian vegetation or wetland vegetation).
   c. Verify and update species list, identifying, highlighting, and locating flora species that are of Conservation Concern, Threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and any respective Provincial Ordinances. Mapping of any populations of such species observed during the site visit.
   d. Mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and flora species of special concern, the outcome being a detailed sensitivity map ranked into high, medium, or low classes.
   e. The proposed fee includes a single site visit only but depending on when the initial site visit is undertaken, additional follow-up visits in different seasons may be required, in order to meet the species assessment protocol requirements.
3. Detailed reporting will be comprised of a Draft Terrestrial Biodiversity Assessment Report (for public review and comment) and a Final Terrestrial Biodiversity Assessment Report for submission. The draft and final detailed reports will address the following (as per the gazetted Terrestrial Biodiversity Assessment Protocol):
4. Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
5. A detailed flora species list highlighting the various species of special concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds). Clearly indicate the need for any further permitting/licensing or detailed studies to specification of animal and plant species protocols.
6. Faunal assessment will be compromised of a general fauna desktop assessment, as well as specific taxa specialist assessments, which would include on-site assessments as required and camera trapping. It is not anticipated that any methods requiring fauna capture will be followed.
7. Description and assessment of the habitat units and site sensitivities ranked into high, medium, or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
8. A habitat sensitivity map will be compiled, indicting the sensitivities as described above, inclusive of a riparian delineation for the aquatic report.
9. A map indicating buffers to accommodate Regional Planning requirements (if required).
10. Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
11. A comprehensive EMPr for inclusion in the reports and EMP with specific management actions for construction and Operation.
12. Address any comments raised by IAP's or identified in the project in the final draft and final report.

This terrestrial biodiversity assessment report is aligned with the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

### 1.4.1 Site visit

A preliminary site verification for screening purposes was conducted between 25 and 28 April 2023. This initial site visit did not include any detailed habitat or species assessments, the purpose being to obtain an overview of the site only and to identify possible risks to the proposed activity and undertake preliminary habitat mapping in order to inform layout revisions. A follow up site visit was conducted between 24 & 26 May 2023 in order to supplement the initial findings, undertake further species surveys as well as refine sensitivity mapping, after which further layout revisions were made.

### 1.4.2 Data sources and references

A comprehensive list of references, including data sources is provided in Section 7. Data sources that were utilised for this report include the following:

- National (DEA) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2022) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Conservation Acts and Ordinances. NEM:BA Threatened or Protected Species (ToPS).
- Regional Systematic and Bioregional Planning frameworks, guidelines and GIS data sources.
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI).
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, Esri, Chief Surveyor General (http://csg.dla.gov.za).
- Cadastral and other topographical country data - Chief Surveyor General (http://csg.dla.gov.za)
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

### 1.4.3 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- Any flora surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.

- No assessment has been made of aquatic processes relating to any wetlands, pans, and rivers/seeps and/or estuaries outside of the scope of those having an influence on the terrestrial biodiversity. The May 2023 site visit was however conducted in conjunction with the aquatic specialist and thus aligns to some extent with recommendations made by the aquatic specialist.
- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.

# 2 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on the proposed activity and terrestrial biodiversity[1]:

## *Listing Notice 1 (GNR):*

1. The development of facilities or infrastructure for the generation of electricity from a renewable resource where—
(i) the electricity output is more than 10 megawatts but less than 20 megawatts; or
(ii) the output is 10 megawatts or less, but the total extent of the facility covers an area in excess of 1 hectare.

Activity 1 could apply relating to facilities or infrastructure for the generation of electricity more than 10 megawatts but less than 20 megawatts from a renewable resource but is not related to terrestrial biodiversity unless additional activities are triggered, as below.

12. The development of:
(ii) infrastructure or structures with a physical footprint of 100 square metres or more.
where such development occurs—
(a) within a watercourse.
~~(b) in front of a development setback; or~~
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse: —

Watercourses are present on site and the listed activity will likely be triggered, as construction within watercourses is likely to be required for access road crossings.

19. The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres from a watercourse.

Watercourses are present on site and the listed activity will likely be triggered as construction in watercourses will be required for access roads.

27. The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—
~~(i) the undertaking of a linear activity; or~~

1 *The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list of potential triggers.*

~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

Indigenous vegetation is present on site and the listed activity will likely be triggered as clearing of indigenous vegetation will exceed 1 Ha.

### *Listing Notice 2 (GNR):*

15. The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—

~~(i) the undertaking of a linear activity; or~~

~~(ii) maintenance purposes undertaken in accordance with a maintenance management plan.~~

The WEF footprint will likely require the clearing of greater than 20 Ha of indigenous vegetation, hence Activity 15 would likely be triggered, however the site is within a Renewable Energy Development Zone (REDZ), hence the Basic Assessment process is applicable rather than a Full Scoping & EIA process.

### *Listing Notice 3 (GNR):*

12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(a) Eastern Cape

i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;

ii. Within critical biodiversity areas identified in bioregional plans;

iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;

iv. Outside urban areas, within 100 metres inland from an estuarine functional zone; or

v. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

Portions of the site are designated as CBA, hence this activity could be triggered, depending on final layout, including access roads and other infrastructure. A single turbine and less than 1 km of access road falls within a designated CBA 2 area, hence this activity will be triggered.

Activity 14: The development of—

(ii) infrastructure or structures with a physical footprint of 10 m² or more, where such development occurs—

(a) within a watercourse;

(b) in front of a development setback; or

(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse

In the Eastern Cape –

i. Outside urban areas:

(aa) A protected area identified in terms of NEMPAA, excluding conservancies;

(bb) National Protected Area Expansion Strategy Focus areas;

(cc) World Heritage Sites;

(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;
(ee) Sites or areas identified in terms of an international Convention;
(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;
(gg) Core areas in biosphere reserves;
(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve

Portions of the site are designated as CBA and/or ESA, hence this activity will likely be triggered, depending on final layout, including access roads and other infrastructure. A single turbine and less than 1 km of access road falls within a designated CBA 2 area, hence this activity will be triggered.

*Implications:*

- The proposed activity will require the clearing of more than 300 $m^2$ of indigenous vegetation and greater than 1 Ha and 20 Ha of indigenous vegetation and/or an activity in a watercourse to construct access road crossings, hence as a minimum a Basic Assessment application process would be triggered.
- Due to the scale of the project and largely indigenous nature of the site, it is likely that more than 20 Ha of indigenous vegetation will require clearing, however the site is within a Renewable Energy Development Zone (REDZ), hence the Basic Assessment process is applicable rather than a Full Scoping & EIA process.
- Additional listed activities that may pertain to the type of activity (WEF) rather than directly to terrestrial biodiversity features have not been considered in depth.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- NEMA: Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMA's) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
- Liability for any environmental damage, pollution, or ecological degradation: Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing, or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.
- Public participation: Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and considered when the administrative discretion to grant or refuse the licence is made.
- Constitution of Republic of South Africa (1996): Section 24(a) of the Constitution states that everyone has the right *'to an environment that is not harmful to their health or well-being'*. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.

- National Forests Act 84 of 1998 with Amendments: Lists Protected trees, requiring permits for removal Department of Agriculture, Forestry and Fisheries). Section (3)(a) of the National Forests Act stipulate that '*natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social, or environmental benefits*'.
- Water Use Authorisations: The National Water Act (No. 36 of 1998): Requires that provision is made both in terms of water quantity and quality for 'the reserve', namely, to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed, and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- Conservation of Agricultural Resources Act 43 of 1993: Lists Alien invasive species requiring removal.
- National Environmental Management Act, 1998 (Act No. 107 of 1998): DARDLEA and DEA are the Competent Authority for the implementation of the National Environmental Impact Assessment Regulations, promulgated under the National Environmental Management Act NEMA], as amended.

## 2.1 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 1), that included the following features:

- Critically Endangered and Endangered Ecosystems
- Vulnerable Ecosystems
- Critical Biodiversity Areas & Ecological Support Areas
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and NPAES
- Critical Habitat for listed endemic or protected species.

*Table 1: Summary of Regional Planning Biodiversity features.*

| FEATURE[2] | DESCRIPTION | IMPLICATIONS/COMMENT |
|---|---|---|
| National Environmental Screening Tool | Terrestrial Biodiversity – *Very High & Low*<br>Animal Species – *High, Medium, & Low*<br>Plant Species – *Medium & Low*<br>Aquatic Biodiversity – *Very High & Low* | CBA 2, ESA 1 & 2, FEPA sub-catchments.<br>Various faunal species of conservation concern have been flagged as potentially present.<br>Various floral species of conservation concern have been flagged as potentially present.<br>Rivers & Wetlands |
| National Vegetation Map (NVM, 2018) | Eastern Lower Karoo (NKl2)<br>Southern Karoo Riviere (AZi6)<br>Upper Karoo Hardeveld (NKu2) | Least Concern<br>Least Concern<br>Least Concern |
| Critically Endangered and Endangered Ecosystems (NBA 2018) | None | N/A |
| Vulnerable Ecosystems (NBA) | None | N/A |

[2] Refer to Section 2.1.

| FEATURE[2] | DESCRIPTION | IMPLICATIONS/COMMENT |
|---|---|---|
| Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) | Western section of site is designated ONA, the central and eastern parts of the site are designated CBA 2 and ESA 1. | The sites are within designated ESA and CBA areas, mostly associated with the drainage features through the site (Southern Karoo Riviere) |
| Protected Areas (SAPAD) | Steenbokkie Private Nature Reserve >50 km W, Aberdeen Nature Reserve >20 km E, Camdeboo National Park >50 km NE, Mountain Zebra-Camdeboo Protected Environment > 15 km NE. | No protected areas nor any ecological processes associated with them are directly affected by the proposed WEF project. |
| NPAES | None | N/A |
| Strategic Water Source Areas (SWSA) | Not situated within a designated SWSA area. | Specific activity unlikely to have any significant impact to downstream water resources. |
| Freshwater Ecosystem Priority Areas (FEPA's) | The majority of the site falls within a FEPA with the eastern portion of the site designated FishFSA and the a corner of the western portion designated as Upstream. The Kraai River (CLASS C: MODERATELY MODIFIED) runs through the eastern section. | Further investigation and recommendations by aquatic specialist will be required. |
| Regional Hotspots & Regions of Endemism | Outside of any endemism hotspots. | N/A, although species of conservation concern are known from the surrounding area. |
| Important Bird Areas (IBA's) | Karoo National Park IBA around >70 km north-east of the site footprints. | The specific activity will unlikely have any direct impact on the IBA. The IBA is mostly within a mountainous area, whereas the site is situated in a plain, however site likely to provide occasional habitat for species that are associated with the IBA. |
| Key Biodiversity Areas (KBA's) | None | N/A |
| Marine/Coastal areas | None | N/A |
| Estuaries | None | N/A |
| RAMSAR sites | None | N/A |
| Within 32 m of Watercourse | Several non-perennial watercourses are present on both sites. | Watercourses will only be affected if proposed activity is undertaken in proximity or where access road crossings are required. |
| Within 100 m of River | The Kraai River (CLASS C: MODERATELY MODIFIED) runs through the eastern section of the site footprint. | Activity will occur within 100 m of a river. Further investigation and recommendations by aquatic specialist will be required. |
| Within 500 m of Wetland | The site footprints contain several NBA & NFEPA classified wetlands. Several man-made dams of varying size are present on or surrounding the sites. | Wetlands will only be affected if proposed activity is undertaken in proximity. The alluvial areas within the site footprints that might be present, may require further aquatic specialist assessment and could serve a secondary function as habitat for avifauna. |
| Forest | None | N/A |
| Surrounding Land Uses | Mostly commercial dryland agriculture (sheep). | Site is generally natural to near natural within minimal transformation, although historical overgrazing would have been prevalent with evidence still present. |
| Critical Habitat for listed endemic/ protected species | There are several red listed faunal and floral species in the surrounding area (refer to Section 3.1). | |

*Implications:*

- The vegetation units currently have a Least Concern conservation status; hence natural vegetation does not have an elevated status.
- The current Conservation Planning designation for both the site is comprised of a significant proportion being an ESA 1 corridors generally associated with watercourses and some peripheral CBA pockets.
- Non-perennial watercourses are present with several farm dams.
- The Southern Karoo Riviere vegetated area has alluvial fan and pan characteristics that will require further investigation by aquatic specialist.
- The Karoo National Park is located more than 40 km off of the northwestern boundary of the site and unlikely to be directly or indirectly affected.

### 2.1.1 National Environmental Screening Tool

The DFFE screening tool flagged sensitivities are indicated in Figure 2 to Figure 5 below, with the Screening Tool Site Sensitivity Verification Report (SSVR) attached as Appendix I. The content of this report will address the findings of the screening tool as well as any site-specific sensitivities that may not have been identified the screening tool. Not all features may necessarily be directly affected by the activity but being in proximity, the associated risks will be assessed further and addressed in the report where appropriate. The DFFE Screening Tool indicates the following ecological sensitivities for **FE Tango Wind Energy Facility:**

- Terrestrial Biodiversity – *Very High* & *Low*
- Animal Species – *High, Medium,* & *Low*
- Plant Species – *Medium* & *Low*
- Aquatic Biodiversity – *Very High* & *Low*

| SENSITIVITY | DESCRIPTION - FEATURE(S) IN PROXIMITY |
|---|---|
| **Terrestrial Sensitivity** | |
| Very High | CBA 2, ESA 1 & 2, FEPA sub-catchments |
| High | None |
| Medium | None |
| Low | Present |
| **Plant Sensitivity** | |
| Very High | None |
| High | None |
| Medium | Sensitive species 1212 & 1039, *Peersia frithii, Tridentea virescens, Cliffortia montana, Dierama grandiflorum, Erica passerinoides* |
| Low | Present |
| **Animal Sensitivity** | |
| Very High | *None* |
| High | *Aquila verreauxii, Polemaetus bellicosus, Neotis ludwigii, Afrotis afra, Circus maurus* (Birds) |
| Medium | *Neotis ludwigii, Ciconia nigra, Circus maurus* (Birds) & *Chersobius boulengeri* (reptile) |
| Low | Present |
| **Aquatic Sensitivity** | |
| Very High | Rivers & Wetlands, FEPA quinary catchments |
| High | None |
| Medium | None |
| Low | Present |

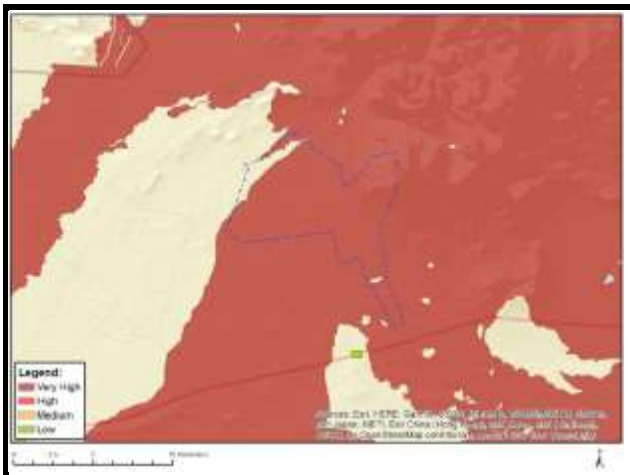


*Figure 2: Terrestrial Biodiversity Sensitivity.*

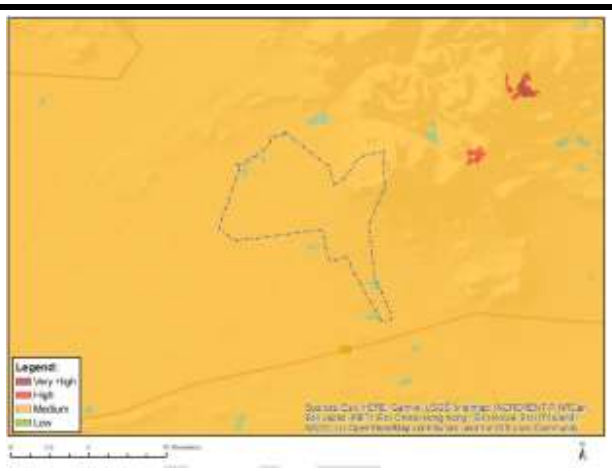


*Figure 3: Plant Species Sensitivity.*

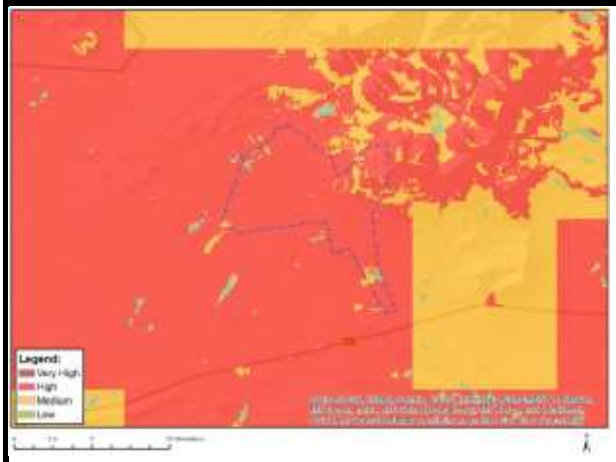


*Figure 4: Animal Species Sensitivity.*

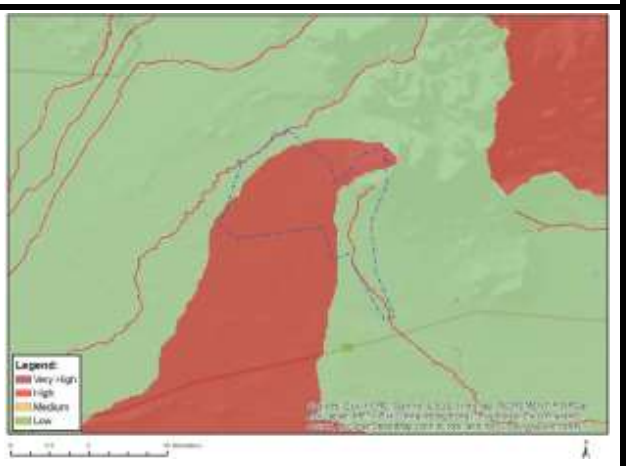


*Figure 5: Aquatic Biodiversity Sensitivity.*

### 2.1.2 Vegetation of Southern Africa

Two vegetation units (Table 1, Figure 6) are primarily affected by the proposed project (Mucina & Rutherford, 2006). The site is located almost entirely within Eastern Lower Karoo (currently having a Least Concern conservation status) and Southern Karoo Riviere (currently having a Least Concern conservation status) vegetation units (Figure 6). A general description of the vegetation units is provided in Appendix D: Systematic Conservation Planning as a reference point for the baseline vegetation composition.

Southern Karoo Riviere is a vegetation type found in the Western and Eastern Cape Provinces of South Africa. It is characterized by narrow riverine flats supporting *Vachellia karroo* or *Tamarix usneoides* thickets, bordered by *Salsola* (saltbush)-dominated shrubland, especially on heavier (and salt-laden) soils on very broad alluvia. The vegetation type occurs on the alluvial plains of among other the Buffels, Dwyka and Gamka Rivers. Altitude ranges considerably between 250 and 1550 m. It is home to a variety of plant species, including *Vachellia karroo, Tamarix usneoides, Salsola* spp., *Acacia karroo, Rhigozum trichotomum*, and *Euphorbia tirucalli*. The vegetation type is also home to a variety of animal species, including Cape fox, Cape ground squirrel, Cape hare, and Cape porcupine. The vegetation type is threatened by a number of factors, including habitat loss, fragmentation, and invasive alien plants. The vegetation type is also threatened by climate change, which is causing the region to become drier. There are a number of conservation initiatives underway to protect the vegetation type including the

establishment of protected areas, such as the Karoo National Park, and the implementation of land management practices that are designed to conserve the vegetation type.

The Eastern Lower Karoo is a semi-arid region of South Africa that lies between the Great Karoo and the Eastern Cape Midlands. It is a vast and sparsely populated region, with a landscape that is characterized by low-lying hills, rocky outcrops, and dry grasslands. The Eastern Lower Karoo is home to a variety of plant and animal species, including succulents, shrubs, and antelope. The dominating vegetation is low to middle-height microphyllous shrubland with drought-resistant 'white' grasses becoming abundant in places, especially on sandy and silty bottomlands. Leaf-succulent dwarf shrubs of the families Aizoaceae and Crassulaceae can also be encountered.

### 2.1.3 Red List of Ecosystem Status and National Biodiversity Assessment

The National Biodiversity Assessment (NBA, 2018) and more recent Red List of Ecosystem Status (RLE, 2022) are the primary tools for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. The RLE/NBA is especially important for informing the National Biodiversity Strategy and Action Plan (NBSAP), the National Biodiversity Framework (NBF) and the National Protected Area Expansion Strategy (NPAES) and informs other national strategies and frameworks across a range of sectors, such as the National Spatial Development Framework, the National Water and Sanitation Master Plan and the National Biodiversity Economy Strategy. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005. It is computed by intersecting maps of ecosystem types and ecological condition with the map of protected areas. Ecosystem types are then categorised based on the proportion of the biodiversity target for each ecosystem type that is included in one or more protected areas. For terrestrial ecosystems, biodiversity targets are set for each ecosystem type using established species–area accumulation curves (ranging between 16 and 34%).

The outcome of the most recent Red List of Ecosystem Status (2022) indicates that Southern Karoo Riviere and Eastern Lower Karoo both have a Least Concern conservation status (Table 1), which is the lowest threat status elevation. This indicates that more than 60 % of the unit remains intact. There is a moderate to low level of utilization of this unit with lower degradation and transformation compared to units having an elevated status. Development of a portion of the site will thus not significantly affect conservation targets for the affected vegetation unit(s).

As is evident from land-use coverages, the broader area is currently not significantly fragmented other than some road networks, with minimal agricultural transformation. The specific site is relatively unmodified, although the specific state or level of degradation cannot be accurately determined without further seasonal site investigations.

*Implications:*

- The vegetation units, Southern Karoo Riviere and Eastern Lower Karoo, have a Least Concern status, indicating that less than 40% has been transformed and there is currently minimal loss or disruptions to ecological functioning at a regional level.

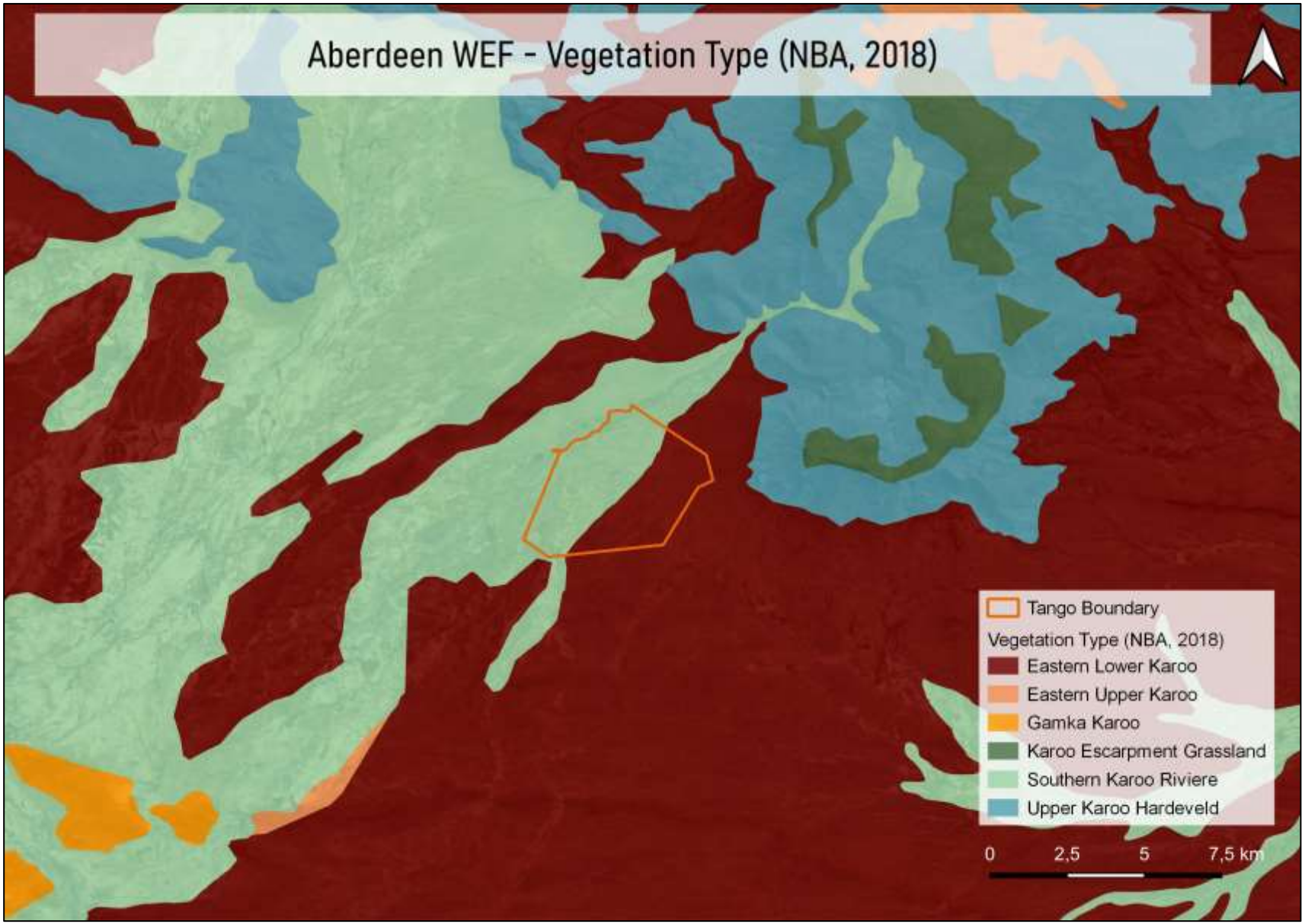


*Figure 6: National Vegetation Map (2018).*

### 2.1.4 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019)

The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, "Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans". A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was undertaken. The ECBCP (2019) will replace the ECBCP (2007) in its entirety as a Systematic Conservation Plan. The ECBCP is not a Bioregional Plan.

As indicated in Figure 7, **FE Tango Wind Energy Facility** site is situated within areas designated ESA 1, CBA 2 and ONA. The ESA corridors are broadly aligned with Southern Karoo Riviere vegetated watercourses with associated adjacent alluvial areas. The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in Table 2.

*Table 2: Linking CBA categories to management objectives.*

| CBA MAP CATEGORY | DESIRED STATE | LAND MANAGEMENT OBJECTIVE |
|---|---|---|
| Ecological Support Area 1 | Functional | Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.<br>For areas classified as ESA 1, the following objectives apply:<br>• These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.<br>• These systems may vary in condition and maintaining function is the main objective, therefore:<br>o Ecosystems still in natural, near natural state should be maintained.<br>o Ecosystems that are moderately disturbed/degraded should be restored. |
| Critical Biodiversity Area 2 | Natural | Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:<br>For areas classified as CBA 2, the following objectives must apply:<br>• Ecosystem and species must remain intact and undisturbed.<br>There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA 2 area may elevate other CBA 2 areas to a CBA 1 category.<br>• These biodiversity features are at risk of reaching their limits of acceptable change.<br>If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented. |
| Other Natural Areas and No Natural Habitat Remaining | Production | No desired state or management objective is provided for ONA or NNR. |

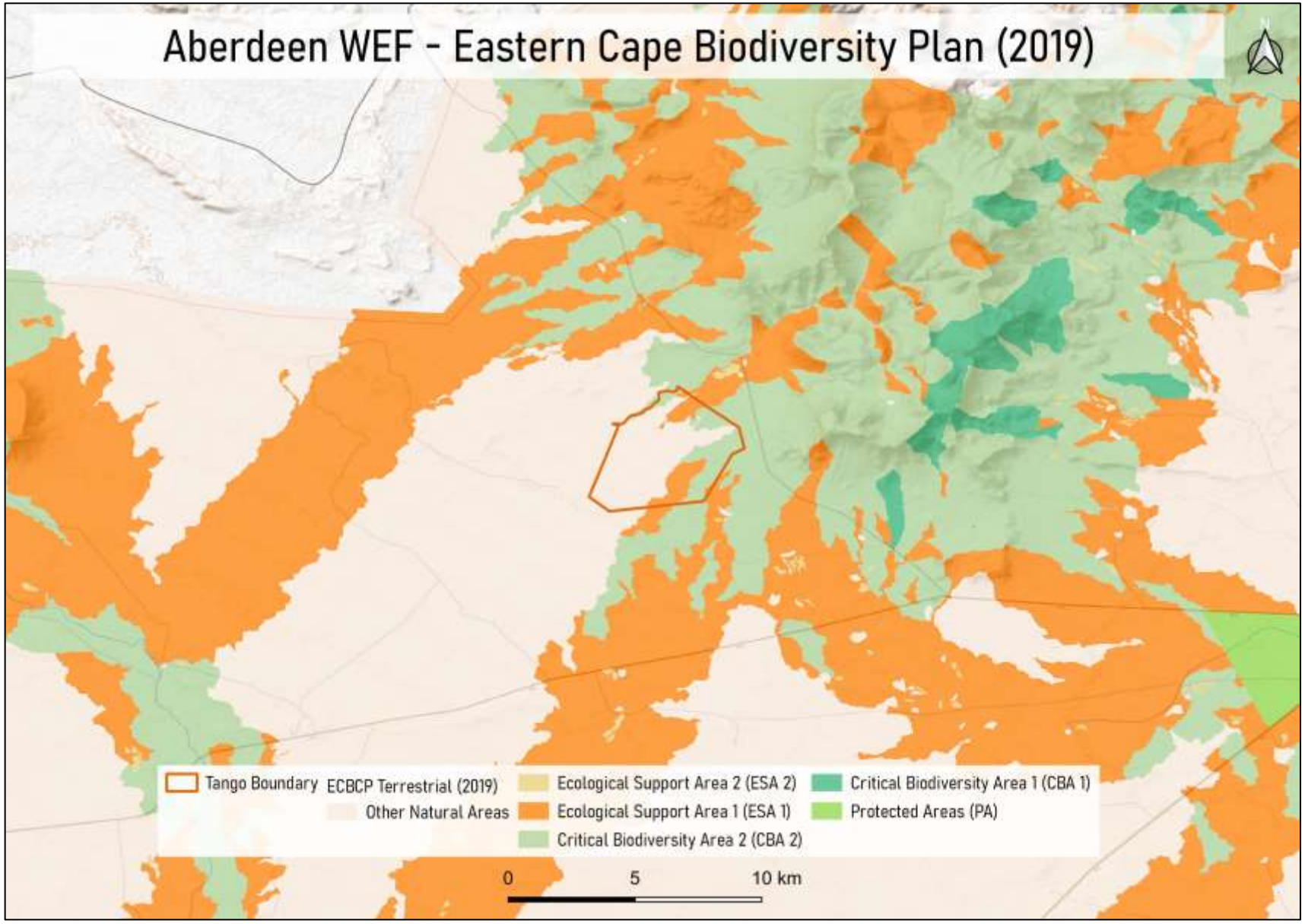


*Figure 7: Critical Biodiversity and Protected Areas (ECBCP, 2019).*

*Implications:*

- The eastern portion of the site intersect with ECBCP (2019) designated Ecological Support Areas (ESA 1) as well as designated Critical Biodiversity Area 2(CBA 2).
- The proposed activity can be compatible with the management objective of ESA's and to some extent with CBA's, provided that appropriate design and routing is informed by expert specialist studies, and that strict conditions, such as limited vegetation clearing, replacement of stripped topsoil and revegation are enforced. Design and mitigation will be required to address issues of connectedness, an important consideration in Ecological Support Areas.
- A single turbine and less than 1 km of road will fall within the designated CBA 2 area, the impact thereof being negligible in terms of loss to a vegetation unit that has low transformation levels (less than 1 %) as well as any disruptions to ecological processes.

### 2.1.5 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans.

### 2.1.6 Strategic Water Source Areas

Strategic water source areas (Figure 8) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas can be regarded as natural "*water factories*", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem. Development of this site is unlikely to have an impact on any Strategic Water Source area (Figure 8).

*Implications:*

- The sites fall outside any designated SWSA areas, being associated rather with the mountainous catchments to the south of the site.
- The proposed activity (Wind Energy Facility) is unlikely to result in any significant impacts to any critical water supply to downstream economies and urban centres because of development of this site, as long as measures are Implemented to not significantly alter water flows.

### 2.1.7 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland, and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or '*FEPAs*'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

- Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of special concern (e.g., very restricted distributions in South Africa)
- River ecosystem types – 20% of total length per type
- Wetland ecosystem types – 20% of total area per type
- Wetland clusters – 20% of total area per wetland vegetation group
- Free-flowing rivers – 20% of total length per ecoregion group
- Priority estuaries – 100% of all priority estuaries, which already considered biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands, and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation, and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or "riparian habitat" along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter ('food') in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its "riparian habitat" by a buffer area.

The sites are bisected by several non-perennial rivers and watercourses (Figure 8 to Figure 10).

The site is drained by a network of unnamed non-perennial (dry) watercourses (Figure 9). Portions of the watercourses are braided within the site, creating an extensive alluvial fan landscape surrounding the watercourses. These drainage lines, which include associated aquatic features or aquatic functional zones within the property boundaries, form the upper catchment of two mainstem rivers, the Ouplaas River (to the north of the site) (Class C: Moderately Modified) and the Kraai River (running through the eastern section of the site) (Class C: Moderately Modified).

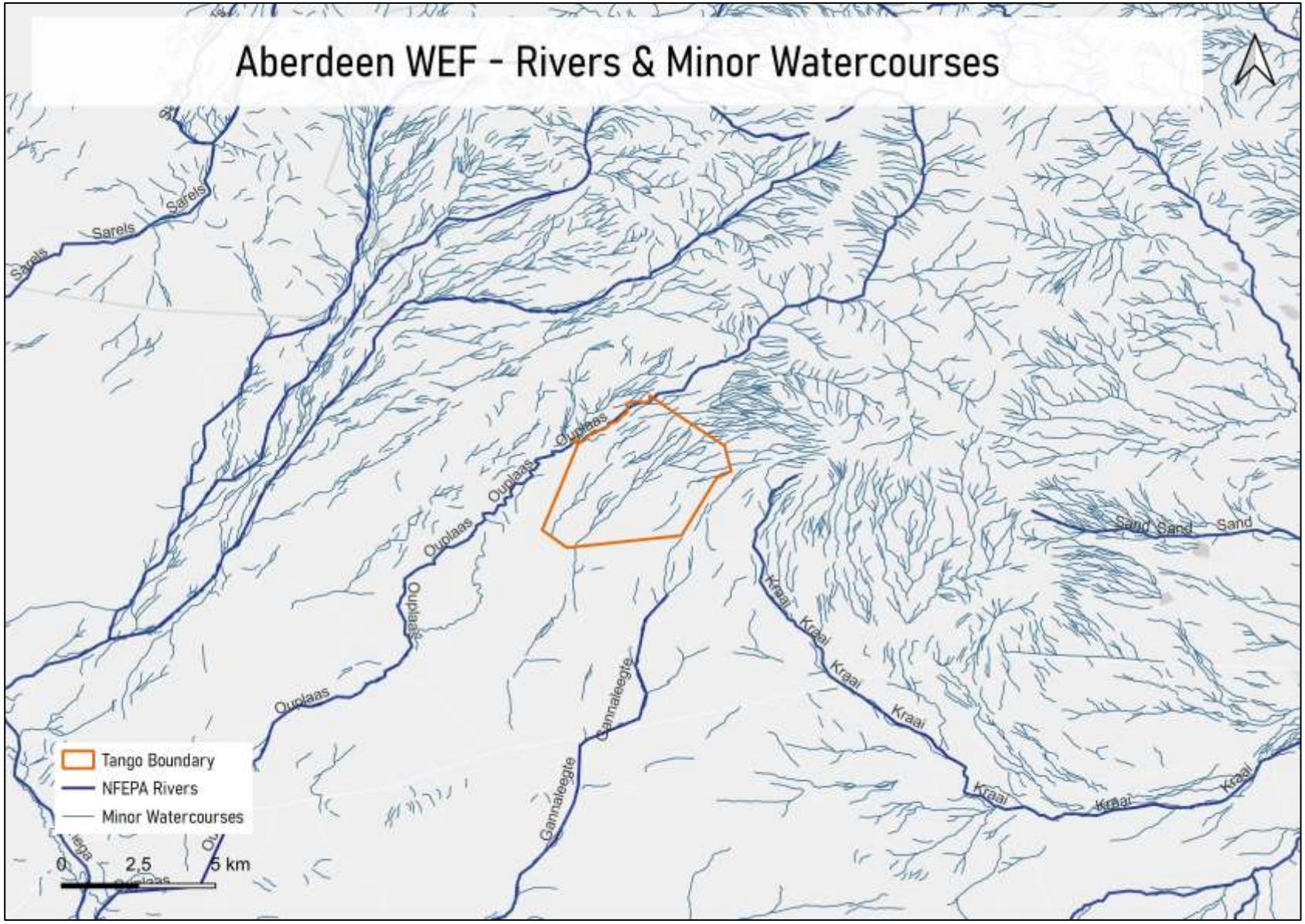


*Figure 8: Rivers and Wetlands.*


*Figure 9: Mainstem Rivers & Minor Watercourses (1:50 000 Topographic) – Tango.*

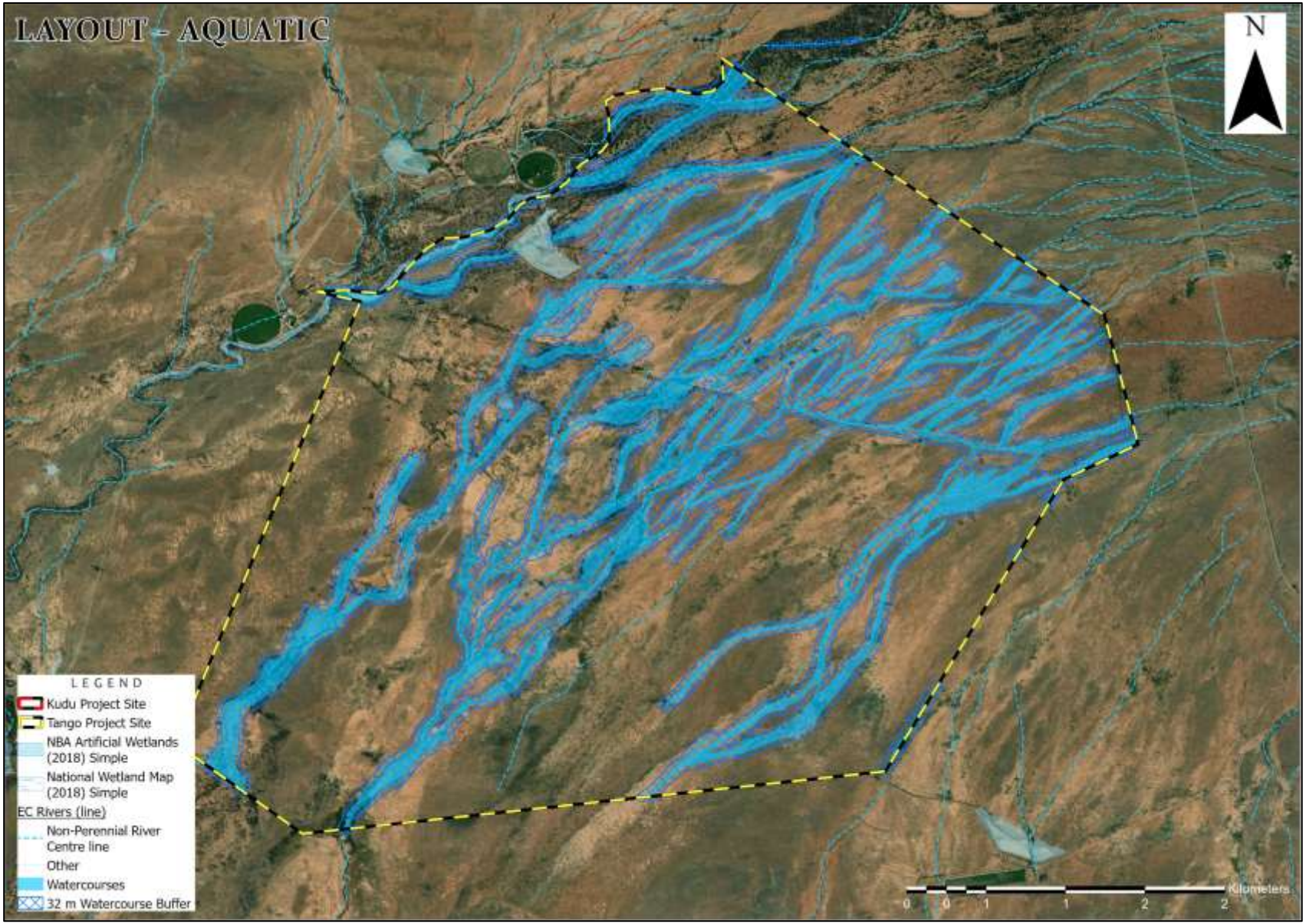


*Figure 10: Delineated mainstem Rivers & Watercourses with 32 m buffers and recommended alluvial corridors.*

Due to the extent of the drainage line network coverage of the site, it is likely that development of any sizable footprint will require development in proximity to minor watercourses, most likely to accommodate the access road network. Further detailed aquatic assessment would thus be required as well as respective Water Use License applications (WULA's).

*Implications:*

- The site is situated within the upper catchment of the Groot- and Gamtoos perennial rivers (Class C: Moderately Modified & Class D: Largely Modified).
- Natural vegetation buffers around these riverine or aquatic features should not be maintained, and appropriate measures are likely to be required to not significantly disrupt ecological processes, which may include provision of measures to allow for lateral movement of water and sediment across road barriers.

### 2.1.8 Regional Hotspots and Centres of Endemism

The site is not situated within any Centre of Endemism.

### 2.1.9 Key Biodiversity Areas

#### *Important Bird Areas*

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.
- To gather new data regularly and monitor IBA's to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

The site is not within any current identified or known Important Bird Areas or Key Biodiversity Areas, the closest being the Karoo National Park IBA to the north-east. The National Screening Tool does identify several bird species that would require further assessment by avifaunal specialist.

*Implications:*

- Several bird species are identified as a sensitive receptor for the site; however, it is not situated within any designated IBA. Additional avifaunal assessment would be required, not covered in this assessment.

### 2.1.10 Protected Areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa. When projects are in legally protected and internationally recognized areas, it should be ensured that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

*Table 3: List of Protected Areas in vicinity*

| NAME | DISTANCE |
|---|---|
| **FE Tango Wind Energy Facility** | |
| Mountain Zebra-Camdeboo Protected Environment | > 15 km NE |
| Aberdeen Nature Reserve | >20 km E |
| Steenbokkie Private Nature Reserve | >50 km W |
| Camdeboo National Park | >50 km NE |

The Mountain Zebra-Camdeboo Protected Environment and the Aberdeen Nature Reserve are the protected areas nearest to the project footprints, the rest of the protected areas within the vicinity are more than 40 km away (Figure 11, Table 3). No other national protected areas or nature reserves are situated with 5 or 10 km of the site. No NPAES (National Protected Area Expansion Area Strategy, 2010 & 2018) designated areas are in close proximity to the site. No Marine Protected Areas or RAMSAR sites are affected or in proximity to the site.

*Implications:*

- The site is not situated in close proximity to any national parks, protected areas or NPAES areas.
- The activity will unlikely have any direct, indirect, or cumulative impact on any protected environment.


*Figure 11: Protected Areas.*

## 2.2 National Biodiversity Offset Guidelines

The National Biodiversity Offset Guidelines were published for implementation, under section 24J of the National Environmental Management Act, 1998 (Act No. 107 of 1998) on 23 June 2023.

### 2.2.1 Context

A Biodiversity Offset refers to *the measurable outcome of compliance with a formal requirement contained in an environmental authorisation to implement an intervention that has the purpose of counterbalancing the residual negative impacts of an activity, or activities, on biodiversity, through increased protection and appropriate management, after every effort has been made to avoid and minimise impacts and rehabilitate affected areas*.

The purpose of the published guideline is to indicate when biodiversity offsets are likely to be required as mitigation by any competent authority (CA), to lay down basic principles for biodiversity offsetting and to guide offset practice in the environmental authorisation (EA) application context.

The guideline is an implementation guideline contemplated in section 24J of the National Environmental Management Act, 1998 (NEMA). Guidelines published in terms of that section give guidance on, inter alia, the implementation, administration, and institutional arrangements of the Environmental Impact Assessment Regulations, 2014 (EIA Regulations) or subsequent regulations regarding the environmental impact assessment process. The guideline does not replace NEMA's provisions regarding EA processes, or the EIA Regulations. It guides the implementation of NEMA and the EIA Regulations in the context of mitigation of biodiversity impacts and use of biodiversity offsets and should therefore be read in conjunction with those laws. It should be noted that the published document is thus a guideline and not a law and should thus be used accordingly by the respective parties.

The guideline is applicable to applications for EA in terms of section 24 of NEMA. However, it may also be applicable to relevant authorities responsible for taking decisions in other regulatory contexts which may involve biodiversity offsetting. Those relevant authorities include the organs of state responsible for taking decisions regarding applications for EA in terms of section 24G of NEMA, emergency directives contemplated in section 30A of NEMA, applications for licences under the National Water Act, 1998, the National Forests Act, 1998 and the National Environmental Management: Waste Act, 2008, applications for development rights in terms of the Spatial Planning and Land Use Management Act, 2013 and requests for the de-proclamation, or the withdrawal of declarations, of protected areas in terms of provincial legislation or NEMPAA.

Biodiversity offsetting is a mitigation measure that is potentially applicable in all EA application processes regardless of the identity of the applicant. This guideline is therefore applicable to EA applications made by private persons or entities, as well as organs of state.

Biodiversity offsetting has the potential to encourage more rigorous consideration of feasible development alternatives which avoid and minimise negative impacts on biodiversity, to help remedy and counterbalance the degradation and loss of biodiversity through increased protection and appropriate management, and to help South Africa to meet its international biodiversity and protected area targets. Biodiversity offsetting can therefore play a role in ensuring that biodiversity and ecological infrastructure can continue to provide the ecosystem services on which people depend for their

livelihoods and contribute to the achievement of the environmental right in section 24 of the Constitution.

In the environmental management context, biodiversity offsetting consists of actions that are taken to comply with biodiversity offset outcomes required in conditions in EAs, Biodiversity Offset Implementation Agreements and environmental management programmes (EMPrs). The environmental management system provided for by NEMA and the EIA Regulations provide for a CA to grant EAs subject to conditions. In appropriate circumstances, a CA may grant an EA subject to the condition that a measurable biodiversity offset is implemented by the EA holder.

As already noted above, this guideline is an implementation guideline contemplated in section 24J of NEMA. It must, in accordance with section 24O of NEMA and regulation 18 of the EIA Regulations, be considered by a CA when considering an application for an EA. It is therefore not absolutely binding and can be deviated from when justifiable under the circumstances.

### 2.2.2 Recommended Requirements

The Biodiversity Guidelines indicate that a biodiversity offset is required when a proposed listed or specified activity, or activities, is/are likely to have residual negative impacts on biodiversity of **medium or high significance**. These negative impacts could affect biodiversity patterns (e.g., threatened ecosystems, species, or special habitats), ecological processes (e.g., migration patterns, climate change corridors enabling shifts in species distributions over time, or wetland function), ecosystem services (e.g., provision of clean water) or a combination of all three.

A residual biodiversity impact is the impact of an activity, or activities, on biodiversity that remains after all efforts have been made to avoid and minimise the impacts of the activity, or activities, and to rehabilitate the affected area to the fullest extent possible.

As part of an EIA, an EAP or a specialist is required to predict the possible negative impacts of an activity, or activities, on biodiversity, including direct impacts, indirect impacts (including the potential impacts of an activity on the climate, where climate change could have negative impacts on biodiversity), and cumulative impacts. After those impacts have been identified, the EAP or specialist must investigate alternative project locations, designs, technologies, scales and layouts to determine if and how potentially significant negative impacts on biodiversity could be avoided or minimised. The EAP or specialist must also determine if, to what extent, and how successfully, impacted areas could be rehabilitated.

It is possible that biodiversity offsets could be required as conditions to the granting of authorisations other than EA, such as licences in terms of the National Forests Act, 1998, which imposes restrictions on development in natural forest ecosystems.

If predictions in the EIA state that all negative impacts on biodiversity cannot be avoided, and/or that impact minimisation and rehabilitation of the affected area cannot, with a high degree of certainty, fully mitigate the impacts of the activity, or activities, on biodiversity, the proposed development would have residual negative biodiversity impacts. The mitigation hierarchy (Avoid>Minimise>Rehabilitate>Offset), as set out in section 2(4)(a)(i) of NEMA, and applicable guidelines, should be followed to determine if there will likely be residual impacts.

Where residual negative biodiversity impacts are evaluated to be of medium or high significance, a biodiversity offset would be required. Biodiversity offsets are unlikely to be required when the residual negative impacts of a proposed activity, or activities, on biodiversity are evaluated to be of low significance. Biodiversity offsets are not appropriate when an activity, or activities, will have residual impacts on biodiversity of very high significance, including when residual negative impacts will result in loss of irreplaceable biodiversity. As already indicated, those developments are fatally flawed and should be avoided.

### 2.2.3 Determining the basic offset ratio

The standard approach to determining a basic biodiversity offset ratio is based on biodiversity targets. Those targets are, in turn, based on Ecosystem Extent, Ecosystem Protection Level and Ecosystem Threat Status of the various ecosystem types identified in the ecosystem assessment conducted as part of the determination of ecosystems that are threatened and in need of protection in terms of the National Environmental Management: Biodiversity Act, 2004. The proposed applicable ratios are listed in the look-up table, provided in the Biodiversity Offset Guidelines. The standard approach is shortly as follows:

1. If the Remaining Ecosystem Extent (REE) is less than or equal to 30%, the precautionary principle demands that a 30:1 ratio must be applied.
2. If the remaining Ecosystem Extent is between 30 and 70%, the ratios provided for in the look-up table in the Biodiversity Guidelines, which takes into consideration Ecosystem Extent and Ecosystem Protection Level (EPL), should be applied. The ratios in that range of Ecosystem Extent vary between 1:22 to 1:1 depending on the extent of the ecosystem remaining and how much of the relevant ecosystem type is protected. In the table below, ratios were assigned to 6 different "bands" based on remaining ecosystem extent and ecosystem protection level.
3. Remaining Ecosystem Extents above 70 % are allocated an offset ratio of nil (0) at all protection levels, indicating that no Biodiversity Offset is required.
4. Taking into consideration the Ecosystem Threat Status (ETS): it is recommended that the following ratios are applied for the different ecosystem threat statuses:
    a. Critically Endangered: 30:1.
    b. Endangered: 10:1.
    c. Vulnerable: 5:1.
    d. Least Concern: Nil
5. Following the precautionary approach, it is recommended that the highest of the two ratios described in 2 and 4 above is selected as the starting ratio.

It should be noted that a biodiversity offset could still be required for an activity, or activities, that are likely to have a significant residual negative impact on an ecosystem of Least Concern with an Ecosystem Extent of greater than 70%. In those cases, the starting ratio would be based on the information before the decision-maker, such as the reasons why the biodiversity offset is (or isn't) required.

One of the factors influencing the standard approach was to consider biodiversity spatial plans. This was integrated so as to support the achievement of the biodiversity targets set in those plans. The biodiversity targets set in those plans are not based purely on Ecosystem Extent and Ecosystem Threat Status. Other factors also influence the identification of Critical Biodiversity Areas and Ecological Support Areas, such as the presence of species or important ecological infrastructure.

Biodiversity spatial plans in South Africa usually identify Critical Biodiversity Areas (CBAs) in their respective planning domains (they are ordinarily done at Provincial level). CBAs are areas that must stay in, or be rehabilitated to, a largely natural ecological condition to ensure that a viable representative sample of all ecosystem types and species can persist. In most biodiversity spatial plans, there are two sub-categories of CBAs: CBA 1 and CBA 2. In most of those spatial biodiversity plans, CBA 1 sites are selected because there are no other options in the relevant planning domain for the relevant target to be met. They are therefore sometimes called CBA: Irreplaceable. The selection of CBA 2 sites is based on a range of factors, including spatial efficiency, complementarity, connectivity, avoidance of conflict with other land uses, and alignment with socio-economic opportunities for conservation if these are known. They are often known as CBA: Optimal.

It is recommended in the Guideline that significant negative impacts on biodiversity in CBA 1's are avoided because of the irreplaceability of those sites. For this reason, a punitive 30:1 ratio is applied to all CBA 1 sites. For significant residual negative impacts on biodiversity in CBA 2's, it is recommended that the Starting Offset Ratio (D) is multiplied by a factor of 1.5. The rationale for the latter recommendation is that whilst CBA 2's represent the best locations to meet conservation targets, the sites are not irreplaceable and as such, the application of a punitive 30:1 ratio cannot be justified.

Ideally, a site should only be selected as a CBA if it is currently in good ecological condition. However, in some circumstances it may be necessary to select a site in fair ecological condition as a CBA. Only in exceptional circumstances, when biodiversity targets for representation cannot otherwise be met, will a site that is severely modified be selected as a CBA. It is therefore not always the case that only areas in good ecological condition are selected as CBAs. CBA 1 and CBA 2 mean different things in some biodiversity spatial plans. For example, in the Western Cape Biodiversity Spatial Plan (2017), CBA 1's areas are CBA's in good ecological condition and CBA 2's are CBA's in fair or modified ecological condition.

It is emphasised here that the standard approach is not binding, but a guide based on relevant scientific information on ecosystems. Competent authorities must apply their minds to each case, which would involve considering additional factors, such as the size of the historical extent of the ecosystem measured against the extent of the residual negative impact (if a large percentage of the extent of the ecosystem would be impacted on, a higher ratio would be justified) and the cumulative residual negative impact of the activity, or activities, on biodiversity.

Some provincial conservation authorities or CAs have adopted, or may in future adopt, province- specific approaches to determining biodiversity offset ratios, based on province-specific biodiversity targets. Those approaches take precedence over the standard approach provided for in this guideline provided that they are scientifically defensible.

Consideration also needs to be given to how ratios are determined for development in the urban setting. It is likely that there would be good reasons for adjusting biodiversity offset ratios down for activities in the urban setting given the relative scarcity of space and natural areas in those areas. In this regard, consideration should be given to approaches for determining biodiversity offset ratios for development in the urban environment.

Biodiversity offsets require that ecosystems are considered, protected and managed within their landscape and functional context. Some ecosystems, namely forests and wetlands, require a slightly

different approach to determining the size of offsets from the standard approach described above. For these ecosystems, historical guidance, mitigation practice, and/or specific legal protection, necessitate this different approach. However, it is desirable for there to be alignment between the different approaches to biodiversity offsetting wherever possible. The approach for natural forests is discussed below.

### 2.2.4 Wetland Ecosystem Types

Wetland ecosystems require mitigation for the loss of biodiversity (i.e. wetland ecosystem type and wetland species), and for impacts on wetland (hydrological) functioning. The standard approach described in the Biodiversity Offset Guidelines (2023) also applies to wetlands. However, the negative impacts of an activity, or activities, on wetland functioning need to be addressed through the rehabilitation of degraded wetland systems, careful location of biodiversity offset sites in the wider hydrological landscape, and/or the removal, reversal or curbing of activities or processes threatening their effective functioning. Increasing wetland offset area is often not a suitable substitute for improving wetland functioning as an offset. *Wetland Offsets: A Best Practice Guideline for South Africa (2016)* provides more guidance on wetland offsets, which should be read in conjunction with this guideline.

### 2.2.5 Forest Ecosystem Types

Activities which have residual negative impacts on forest ecosystems often require both an EA and a licence in terms of the National Forests Act, 1998 (NFA). The NFA, the primary law for the protection of natural forests in South Africa, provides that natural forests must not be destroyed save in **exceptional circumstances**. This implies that the target for conserving remaining forests is the remaining extent of the forest ecosystem type (i.e., they constitute irreplaceable biodiversity). Where an activity would have the effect of negatively impacting on a natural forest, and the "exceptional circumstances" referred to in the NFA are present, ecological compensation would be required. This compensation may include, but is not necessarily limited to, removing or reducing the activities or processes that impede or threaten forest regeneration, or that result in ongoing loss of that forest type, or a nearby related type. The strong protection given to natural forests by the National Forests Act, 1998 due the rarity of the biome and its high ecosystem services, in practice means that any impacts on such forests are regarded as serious, and in the case of endangered forest types, as fatally flawed.

As already stated, an offset may well be required where a listed or specified activity would involve the removal of one or more protected tree species, despite the fact that application of this guideline's approach for determining when an offset is required suggests that no biodiversity offset is required. In such instances, the biodiversity offset requirements should involve an offset area to maintain or increase viable populations of the same tree species as those impacted or involve reducing or removing other activities or processes that threaten the persistence, recruitment or survival of protected trees, or both.

## 2.3 Vegetation and Ecological Processes and Corridors

### 2.3.1 Critical/Important Terrestrial Habitats

Critical or Important Terrestrial habitats include areas that are rare within a region, or which support important species, ecosystems, or ecological processes. Species of Special Concern refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal, or other organisms (e.g., reptiles, insects etc) that have been assessed and

classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (ToPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such red data species that are under threat of extinction.

### *Rocky Outcrops*

Rocky outcrops can provide habitat for geophytic species that often have limited distributions. Rocky areas may be present in higher lying areas within the grassland, most likely in areas that have not been cultivated, as they would have marginal suitability for agriculture. Rocky outcrops can be present in several forms from flat pavement like outcrops with little to know soil cover, areas covered in gravel and small boulder material, quartz patches, calcrete lenses, and several forms of larger outcrops that may also have faunal associations (such as for example Dassies or Karoo Padloper).

Rocky areas are present within the site, but not well-defined rocky outcrops. Rocky habitat, which includes primarily gravel patches, is not the type preferred by the Karoo Padloper.

### *Wetland habitat*

Wetlands are special habitats as they provide a refuge for birds and other organism, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be Critical Biodiversity Areas. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. No wetland habitat has been identified, but this aspect is be dealt with in a separate aquatic assessment (Refer to separate aquatic specialist assessment). Where observational comments in this report contradict any made in aquatic assessment report, the aquatic specialist will supersede those made in this report. None are deemed to have any significant flora, and any fauna is unlikely to be affected by the proposed activity. Wetlands or Estuaries are protected by various pieces of legislation, such as:

- The *National Water Act* (NWA) 36 of 1998, which stipulates that reserve determination studies need to be undertaken to identify the ecological reserve requirements of a wetland.
- The *NEMA* in terms of principle (r) and the listed activities (Section 24).
- The *Conservation of Agricultural Resources Act* (CARA) 43 of 1983; in which no activities are allowed within the flood area or within 10 meters horizontally outside the flood area.
- The *Integrated Coastal Management Act* (ICMA) 24 of 2008 requires the preparation of Estuary Management Plans by municipalities, unless managed by another Authority e.g., SANParks.

Natural wetlands include extensive unchanneled valley bottom wetlands, and depressions, will be assessed in further detail as per the aquatic assessment.

### *Priority Estuaries*

No Estuaries are affected by the proposed activity.

### *Forest*

No forest if present.

### *Fynbos*

No Fynbos is associated with the area.

### *Colonies or Populations of Threatened or Protected Species*

Further assessment would be required including surveys for populations of terrestrial fauna and flora species of concern.

*Implications:*

- Wetland habitat and various forms of rocky outcrops are present and would require further investigation and delineation to determine possible species of conservation concern, aquatic processes, and overall sensitivity.
- Faunal species as identified by the Screening Tool are likely to require further investigation, but suitable habitat within the footprint for the Karoo Padloper is limited.
- Further information is provided in the species assessment section.

# 3 Biodiversity Risk Identification and Assessment

## 3.1 Baseline Biodiversity Description

### 3.1.1 Habitat Overview

The site is situated between Beaufort West to the north-west and Aberdeen to the south-east, in the Eastern Cape province, with the FE Tango Wind Energy Facility site lying to the east, slightly north of the R61 district road. The site is situated within a commercial livestock and game farming area (Refer to Figure 1), generally comprising dryland grazing. The portion assessed is approximately 2 250 Ha in extent. The area falls within a low, predominantly summer rainfall area. Refer to Figure 12 for an aerial photo of the site.

The site is drained by several non-perennial watercourses with an extensive network of drainage lines forming a less pronounced alluvial fan network on the FE Tango Wind Energy Facility site, some with notable channels but others without distinctive channels. Vegetation around the watercourses and drainage lines tend to be shrubbier than the surrounding landscape and lower order watercourses, being more defined, tend to have an associated tree fringe. Several man-made impoundments (dams) are present as well as what appear to be constructed canals to drain standing water from the alluvial fan and pan areas. The alluvial areas generally have poor vegetation cover, limited to a few species due to elevated salinity and occasional standing water, including several saltbush (*Salsola*) species.

The landscape surrounding these low lying alluvial areas is comprised of slightly undulating plains covered with dwarf spiny shrubland dominated by Karoo dwarf shrubs (e.g., *Chrysocoma ciliata, Eriocephalus ericoides*) with rare low trees (e.g., *Euclea undulata*), sometimes having dense stands of drought-resistant grass (*Stipagrostis, Aristida*) cover (especially after abundant rains) on broad sandy bottomlands (Figure 13).

Elevated slopes and hills have a rockier substrate generally having a shrubby vegetation, while lower lying non alluvial grassy areas are prevalent in sandier substrates. In general flora diversity is low to moderate, based on seasonal sampling , which is deemed to be adequate for the site. Several distinct

habitats or communities are likely to provide a range of faunal habitat. Further details regarding the various communities and landscapes are described below.

### 3.1.2 Mapped Vegetation

Vegetation has provisionally been mapped from most recent available aerial photography (Figure 13) supported by site observations made during both of the site visits, and is comprised of the following broad categories:

#### *Riverine*

Natural vegetation surrounding watercourses, generally comprising a fringe of medium sized trees, primarily *Acacia karoo* and shrubs with some typical riparian elements (sedges and reeds), usually where standing water is present for extended periods. Grassland elements tend to be lusher along lower order watercourses or where wet conditions persist longer than surrounding areas, where the thicket is absent or sparser. Vary in size from deeply incised watercourses with dense thicket fringe, to shallow channels with grasses and or a fringe of low shrubs. It is likely that over time the course of the shallower watercourses and drainage lines will move or migrate to some extent within the flat alluvial fan/floodplain area. Occasional sedges do occur, more prevalent where standing water persists (such as around the fringes of dams or pools within the watercourses) but are not the norm.

Riverine areas should not be developed other than for crossings of linear features (access roads), including a 32 m watercourse. Where turbines may be in proximity to watercourses or buffers, the laydown areas should be orientated away from rather than toward the watercourse (or buffer).

*Alluvial*

Areas where watercourses become braided forming alluvial fan like features in extensive flat low-lying area surrounding the watercourses, having low shrubs predominantly *Salsola* spp. Present but not prevalent on the FE Tango Wind Energy Facility site.

While vegetation composition and coverage are poor, such areas are likely to provide important seasonal habitat for birds and other fauna during rainy periods. Seasonally persistent wet conditions and clayey soils would likely pose some challenges during the construction phase due to waterlogged soils and slippery conditions. Absence of any riparian indicators suggest that this is not wetland habitat, standing water is unlikely to persist for sufficient periods of time.

### *Transitional*

Areas with above alluvial properties but also with more well developed grassy and shrubby Karoid elements become more prevalent. The transition from alluvial to karroid is often gradual and can extend over distance and the boundaries indicated in the mapping may not reflect or be differentiated on the ground as an exact or clearly differentiable boundary. Some smaller areas share characteristics of grassy Karoid vegetation described below and there may be some overlap in mapping with alluvial delineation due to the transitional nature.

*Karoid (Grassy)*

Natural/Near Natural vegetation in low-lying sandy areas surrounding and dispersed within the above alluvial and transitional vegetation communities. Some small typical karroid shrubs may be present but are not dominant and typical alluvial shrubs such as Salsola spp, are also occasionally present, but also not dominant.

*Karoid (Rocky/Shrubby)*

Rockier areas, often on slopes or slightly raised hills, with poor or non-sandy soils generally dominated by shrubs and herbaceous species with occasional grasses occurring. Rocky/Shrub community is not well represented on the site and restricted to a few peripheral areas. Several rocky community variations are present, the most prevalent being rocky gravel patches with small boulders and rocks. Rocky pavements (flat areas with soil mostly absent) are also present but uncommon.

Such rocky karroid areas generally have a more dominant succulent species composition. While rocky habitat is known to be habitat for reptiles such as the Karoo padloper, larger rocks that provide suitable cracks and crevices are not present, hence the area is likely unsuitable for the Karoo Padloper tortoise. This community is not differentiated from grassy karroid vegetation above in terms of the vegetation mapping, and there is likely some overlap with the transitional delineation.

### *Transformed*

Transformed areas are minimal within the site, comprising a few areas of old lands or other areas that have been transformed and would include roads and other cleared areas such as dwellings. More prevalent in areas surrounding the site such as dwellings and currently cultivated lands.

### *Dams*

Man made impoundments. Several farm dams are present, often having a fridge of sedges and or reds present. Will have standing water for extended periods and likely to provide faunal habitat for a range of faunal species. Being within an arid area, such dams or small impoundments should be avoided.

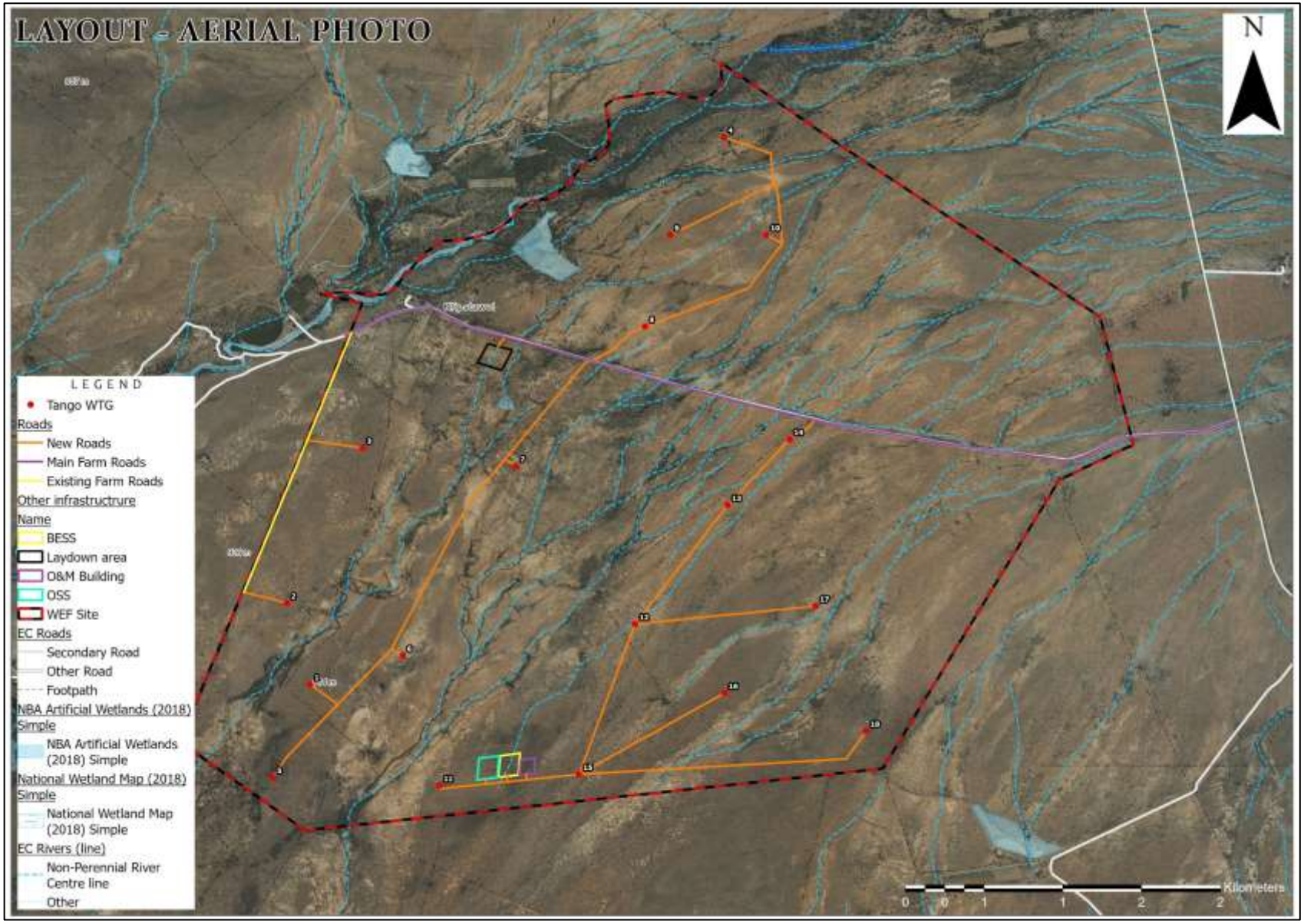


*Figure 12: Aerial Photo of the FE Tango Wind Energy Facility site with layout indicated.*

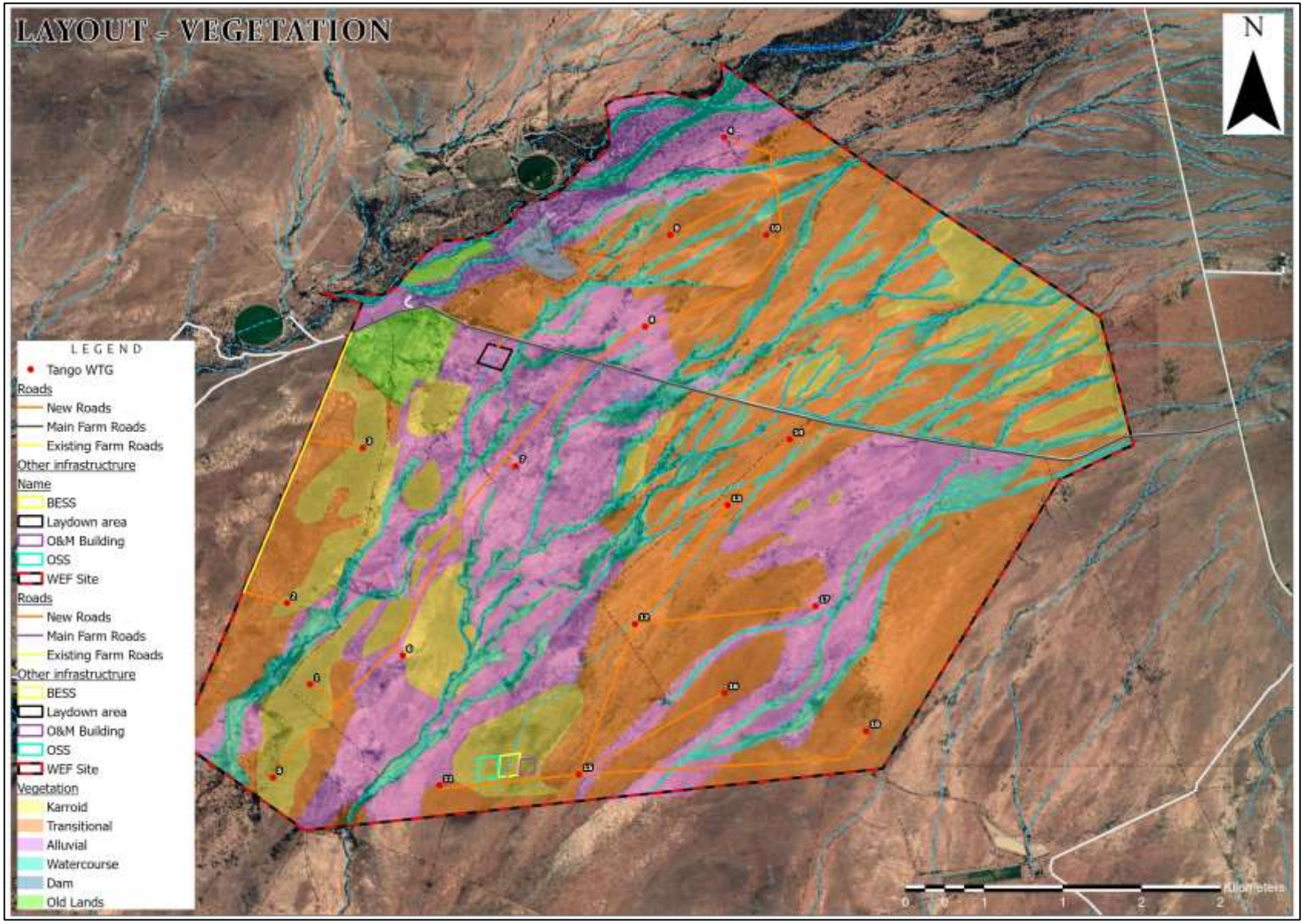


*Figure 13: On-site mapped vegetation communities and/or habitat units.*

A breakdown of the *approximate* are of the above vegetation communities (habitat) is provided below (Table 4):

*Table 4: Vegetation community areas.*

| SITE | VEGETATION | AREA (HA) |
|---|---|---|
| FE Tango Wind Energy Facility | Transitional | 857.5 |
| FE Tango Wind Energy Facility | Alluvial | 645.3 |
| FE Tango Wind Energy Facility | Watercourse | 402.9 |
| FE Tango Wind Energy Facility | Karroid | 290.5 |
| FE Tango Wind Energy Facility | Old Lands | 40.1 |
| FE Tango Wind Energy Facility | Dam | 10.0 |
| | **Total Area** | **2 246.3** |

Only the higher order watercourses have been delineated, smaller drainage lines have not been delineated, due to the large number within the alluvial fan areas. Final delineation and sensitivity of these minor watercourses will be subject to the findings of the aquatic assessment, as in terms of terrestrial composition and processes the minor watercourses are not a significant priority. In terms of ecological processes, these minor drainage liens should still be avoided as far as possible.

This landscape offers suitable habitat for a limited suite of animal species due to homogenous nature of the vegetation, although animals may have been displaced by to some extent in the grassland areas.

The optimum approach is to limit loss of more sensitive habitat, and/or where unavoidable representative areas should be retained as ecological corridors.

#### *Vegetation and Flora*

Vegetation is typical and representative of the vegetation unit. Exact composition and levels of disturbance would require a comprehensive site survey and assessment.

Due to having a low conservation status, the *vegetation units present* does in principle provide a suitable footprint for the proposed activity, bearing in mind the potential risks associated with altering flow patterns within an aquatic driven ecosystem (Southern Karoo Riviere) , where additional guidance from the aquatic assessment should be considered regarding the aquatic processes at play and measures that will be required to accommodate the respective ecological processes and connectivity. Significant fill will likely be required to accommodate the access roads and WEF footprints, which could indirectly alter flooding and movement of sediments. This could result in more widespread ecological changes as well as changes in both flora and fauna species composition due to changes in flooding patterns.

### 3.1.3 Flora

#### *Red Listed, Endemic and Protected Flora*

Several flora species are listed in terms of the National Environmental Screening Tool as potentially occurring (per Table 5). Several protected, endemic, range restricted or threatened species are known from the surrounding area and further seasonal assessment would determine which species. Due to the localised nature of the impact, and low to moderate plant overall species sensitivity, the risk of a species being present is at the lower end of the risk scale.

*Table 5: Flora including Species of Special Concern.*

| SCIENTIFIC NAME | FAMILY | STATUS[3] | COMMENT/PRESENCE[4] |
|---|---|---|---|
| *Adromischus fallax* | Crassulaceae | Rare | NKu 2 |
| *Albuca setosa* | Hyacinthaceae | LC, PNCO | NKl 2, NKu 2 |
| *Aloe chlorantha* | Asphodelaceae | NT D2 | NKu 2 |
| *Aloinopsis rubrolineata* | Aizoaceae | LC, PNCO | NKl 2 |
| *Amphiglossa callunoides* | Asteraceae | VU | AZi 6 |
| *Anisodontea malvastroides* | Malvaceae | Rare | NKu 2 |
| *Aridaria noctiflora subsp. straminea* | Aizoaceae | LC, PNCO | NKl 1 |
| *Boophone disticha* | Amaryllidaceae | LC, PNCO | Gh 1, NKu 2 |
| *Chasmatophyllum nelii* | Aizoaceae | LC, PNCO | NKl 2 |
| *Chasmatophyllum stanleyi* | Aizoaceae | LC, PNCO | NKl 1 |
| *Cliffortia arborea* | Rosaceae | VU A2cd; C2a(i) | Gh 1 |
| *Cliffortia montana* | Rosaceae | NEST (M), Rare | A habitat specialist known from two disjunct areas in the Western and Eastern Cape. A very poorly known and rarely collected species with an unusually disjunct distribution. It is possibly overlooked and more common and widespread than collections indicate. No threats known, although inappropriate fire management could negatively affect this species. Possibly present, unconfirmed. |
| *Crassula barbata subsp. broomii* | Crassulaceae | DDT | NKu 2 |
| *Crassula corallina* | Crassulaceae | LC, PNCO | NKl 2 |
| *Crassula muscosa* | Crassulaceae | LC, PNCO | NKl 1, NKl 2 |
| *Cylindrophyllum calamiforme* | Aizoaceae | LC, PNCO | NKl 2 |
| *Delosperma congestum* | Aizoaceae | LC, PNCO | Gh 1 |
| *Delosperma gramineum* | Aizoaceae | LC, PNCO | Gh 1 |
| *Delosperma robustum* | Aizoaceae | LC, PNCO | NKu 2 |
| *Dierama grandiflorum* | Iridaceae | NEST (M), EN B1ab(iii), PNCO | An Eastern Cape endemic (EOO 3444 km²), known from two confirmed locations and possibly still extant at three other locations where it is known from historical records. It is declining due to ongoing habitat degradation. Range is from Graaff-Reinet and Somerset East. An extremely rare and localized endemic known from less than 10 collections. Recent observations of subpopulations on the Bosberg indicate that plants occur in small, sparsely scattered clumps of fewer than 100 plants. Possibly present, Not recorded. |

[3] IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species.

[4] NKl 1 - Gamka Karoo, NKl 2 - Eastern Lower Karoo, AZi 6 - Southern Karoo Riviere, NKu 2 - Upper Karoo Hardeveld & Gh 1 - Karoo Escarpment Grassland

| SCIENTIFIC NAME | FAMILY | STATUS[3] | COMMENT/PRESENCE[4] |
|---|---|---|---|
| *Drimia anomala* | Hyacinthaceae | LC, PNCO | NKl 2 |
| *Drimia intricata* | Hyacinthaceae | LC, PNCO | NKl 1, NKl 2, NKu 2 |
| *Drosanthemum lique* | Aizoaceae | LC, PNCO | NKl 1, NKl 2, AZi 6, NKu 2 |
| *Drosanthemum subspinosum* | Aizoaceae | DDT, PNCO | NKl 2 |
| *Erica caespitosa* | Ericaceae | LC, PNCO | Gh 1 |
| *Erica caffrorum var. caffrorum* | Ericaceae | LC, PNCO | Gh 1 |
| *Erica passerinoides* | Ericaceae | NEST (M), EN B1ab(iii), PNCO | This species is known from between three and five locations and has an extent of occurrence (EOO) of 4312 km². It is continuing to decline due to expanding forestry plantations and alien invasive encroachment. This species is endemic to the mountains of the Eastern Cape interior, where it is known from a few scattered subpopulations in the Sneeuberg in the Koudeveld Mountains, Katberg Pass and Cata Forest Reserve. It occurs on south-facing slopes in karoo-grassland ecotones. The Kamdeboo Mountain subpopulation is large and healthy, with two distinct large stands having been monitored on different summits within the range in the past 10 years. Possibly present, Not recorded. |
| *Erica woodii* | Ericaceae | LC, PNCO | Gh 1 |
| *Eucomis autumnalis subsp. autumnalis* | Hyacinthaceae | NE, PNCO | Gh 1 |
| *Faucaria bosscheana* | Aizoaceae | LC, PNCO | NKu 2 |
| *Galenia fruticosa* | Aizoaceae | LC, PNCO | NKl 1 |
| *Galenia glandulifera* | Aizoaceae | NT B1ab (iii,iv,v), PNCO | NKl 1 |
| *Galenia sarcophylla* | Aizoaceae | LC, PNCO | NKl 1 |
| *Galenia secunda* | Aizoaceae | LC, PNCO | NKl 1, NKl 2 |
| *Gethyllis longistyla* | Amaryllidaceae | Rare, PNCO | NKu 2 |
| *Haemanthus humilis subsp. humilis* | Amaryllidaceae | LC, PNCO | Gh 1 |
| *Haworthia decipiens var. cyanea* | Asphodelaceae | Not Eval | NKl 2 |
| *Haworthia greenii* | Asphodelaceae | PNCO | NKl 2 |
| *Hereroa incurva* | Aizoaceae | LC, PNCO | NKl 1 |
| *Hereroa latipetala* | Aizoaceae | LC, PNCO | NKl 1 |
| *Hereroa odorata* | Aizoaceae | LC, PNCO | NKl 1 |
| *Hermannia filifolia var. filifolia* | Malvaceae | NE | NKu 2 |
| *Hoodia dregei* | Apocynaceae | VU D2 | NKl 1 |
| *Isolepis expallescens* | Cyperaceae | VU D2 | AZi 6 |
| *Kniphofia acraea* | Asphodelaceae | Rare, PNCO | Gh 1 |
| *Lachenalia aurioliae* | Hyacinthaceae | LC, PNCO | NKu 2 |
| *Lotononis azureoides* | Fabaceae | Rare | NKu 2 |

| SCIENTIFIC NAME | FAMILY | STATUS[3] | COMMENT/PRESENCE[4] |
|---|---|---|---|
| *Malephora uitenhagensis* | Aizoaceae | LC, PNCO | AZi 6 |
| *Mestoklema tuberosum* | Aizoaceae | LC, PNCO | NKl 2 |
| *Moraea polystachya* | Iridaceae | LC, PNCO | NKl 1, NKl 2 |
| *Nananthus vittatus* | Aizoaceae | PNCO, DDT (Data Deficient, Taxonomically Problematic) | Not endemic to South Africa. Free State, Northern Cape, North-West provinces. Found on the edges of alluvial areas. Confirmed present in the area, but not within the Tango site. |
| *Ornithogalum paucifolium subsp. karooparkense* | Hyacinthaceae | PNCO | NKu 2 |
| *Peersia frithii* | Aizoaceae | NEST (M), Vulnerable | A species previously collected widely throughout the southern of the Karoo with an historic extent of occurrence (EOO) of 28913 km². It has only been recorded seven times since 1990 and is suspected to be extant at 6 locations from a current EOO of 690 km². Decline is suspected to be the result of livestock overgrazing and trampling. No historical records near the site but it does fall within east-west distribution range. Possibly present, Not recorded. |
| *Pleiospilos compactus* | Aizoaceae | LC, PNCO | NKl 1 |
| *Plinthus karooicus* | Aizoaceae | LC, PNCO | NKl 1, NKl 2, NKu 2 |
| *Psilocaulon articulatum* | Aizoaceae | LC, PNCO | NKl 2 |
| *Psilocaulon coriarium* | Aizoaceae | LC, PNCO | NKl 2 |
| *Rhinephyllum luteum* | Aizoaceae | LC, PNCO | NKl 1 |
| *Rhombophyllum nelii* | Aizoaceae | LC, PNCO | NKl 2 |
| *Ruschia beaufortensis* | Aizoaceae | VU D2, PNCO | NKl 1 |
| *Ruschia cradockensis subsp. cradockensis* | Aizoaceae | LC, PNCO | NKl 2 |
| *Ruschia intricata* | Aizoaceae | LC, PNCO | NKl 1 |
| *Ruschia spinosa* | Aizoaceae | LC, PNCO | NKl 1 |
| *Ruschia vanderbergiae* | Aizoaceae | LC, PNCO | NKl 2 |
| *Salsola arborea* | Chenopodiaceae | Not Eval | AZi 6 |
| *Salsola gemmifera* | Chenopodiaceae | Not Eval | AZi 6 |
| *Salsola tuberculata* | Chenopodiaceae | DDT | NKl 1 |
| *Sceletium expansum* | Aizoaceae | VU B1ab (ii,iii,iv,v) | NKu 2 |
| *Senecio radicans* | Asteraceae | DDT | NKl 2 |
| Sensitive Species 1039 | | NEST (M), Vulnerable | This taxon has a restricted distribution range, with an extent of occurrence (EOO) of 5 594 km². It is known from eight locations and is declining for unknown reasons. This taxon occurs in the southern Great Karoo from Aberdeen and Graaff-Reinet southwards to Rietbron and eastwards to Willowmore, Klipplaat and Steytlerville. Possibly present, Not recorded. |

| SCIENTIFIC NAME | FAMILY | STATUS[3] | COMMENT/PRESENCE[4] |
|---|---|---|---|
| Sensitive species 1212 | | NEST (M), Vulnerable | EOO <7 000 km², known from fewer than 10 locations and habitat quality and number of mature individuals are declining as a result of livestock (sheep and goat) overgrazing and illegal collection for the succulent plant trade. Potentially threatened at some locations by prospecting for uranium mining. Willowmore to Beaufort West and Aberdeen. Possibly present, Not recorded. |
| *Stapelia engleriana* | Apocynaceae | DDT | NKl 1 |
| *Stomatium suaveolens* | Aizoaceae | LC, PNCO | NKu 2 |
| *Syringodea pulchella* | Iridaceae | VU D2, PNCO | Gh 1 |
| *Tetragonia arbuscula* | Aizoaceae | LC, PNCO | NKu 2 |
| *Tetragonia microptera* | Aizoaceae | LC, PNCO | NKl 1 |
| *Trichodiadema barbatum* | Aizoaceae | LC, PNCO | NKl 1, NKl 2, NKu 2 |
| *Tridentea virescens* | Apocynaceae | NEST (M), Rare | A widespread species that occurs as sporadic small subpopulations of up to six plants. No threats are known to impact this species. Warmbad in southern Namibia to Kakamas and Prieska in the Northern Cape stretching east to Prince Albert and Aberdeen. Possibly present, Not recorded. |
| *Tripteris aghillana var. integrifolia* | Asteraceae | NE | Gh 1 |
| *Tritonia tugwelliae* | Iridaceae | LC, PNCO | NKl 1 |
| *Wahlenbergia sphaerica* | Campanulaceae | DDT | Gh 1 |

Several endangered and/or critically endangered species are flagged for the site, however none were found to be present during the site sampling periods. Based on site observations, suitable habitat is limited (i.e., areas outside of alluvial areas) for several of the species. Generally, the most likely species are succulent species that would potentially be amenable to relocation if required.

Several flora species, having protected status in terms of the respective Eastern Cape Conservation Ordinance are likely to be present, for which permits would be required. These are indicated in the table above.

### 3.1.4 Fauna

The habitats and microhabitats present on the project site are not unique and although highly fragmented, are widespread in the broader area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.

#### *Mammals*

National Environmental Screening Tool identifies no mammal species. Black Footed Cat may be in the wider area. Riverine Rabbit ios not anticipated to be present. Other species are likely to be widespread and or species not under threat.

### *Avifauna and Bats*

National Environmental Screening Tool identifies several bird species as possibly being in the area and an avifaunal assessment is likely to be required. Outside of the scope of this assessment.

### *Reptiles*

Reptiles such as lizards, snakes and tortoises may be present. National Environmental Screening Tool identifies *Chersobius boulengeri* (Karoo Padloper), as possibly occurring in the area. Initial site investigations suggest that this species is unlikely to be present due to unsuitability of habitat in the lower lying areas of the sites, where development would occur.

### *Amphibians*

National Environmental Screening Tool identifies no amphibian species of conservation concern as possibly being in the area. Amphibians are likely to be present due to the prevalence of watercourses and wetland areas, however no species of conservation concern are flagged for the site.

### *Invertebrates*

National Environmental Screening Tool identifies no invertebrate species of conservation concern as possibly being in the area. Site assessment not required but would be required to confirm.

### *Red Listed and Protected Fauna*

As per Table 6, Endangered or Critically terrestrial fauna species are flagged for the site. The site falls within the potential distribution range of faunal species of conservation concern. No further avifaunal investigations have been undertaken but the single reptile species (Karoo Padloper) has a significantly wider distribution than the site. Site investigations indicate that the preferred habitat for the Karoo Padloper tortoise, which is known to have specialised habitat (rocky areas), is not prevalent on the site, thus a population of the tortoise is not likely to be present as suitable habitat was not located within the project footprint.

*Table 6: Fauna Species of Special Concern*

| SCIENTIFIC NAME | COMMON NAME | STATUS[5] | COMMENT/PRESENCE |
|---|---|---|---|
| **Mammals** | | | |
| None of concern | | | |
| **Birds** | | | |
| *Afrotis afra* | Southern Black Bustard | VU (A4bc), NEST (H, M | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |
| *Cursorius rufus* | Burchell's Courser | LC (NEST, H) | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |
| *Neotis ludwigii* | Ludwig's Bustard | EN A4cd, NEST (H) | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |
| *Aquila verreauxii* | Verreaux's Eagle | VU A2c; C1, NEST (H) | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |
| *Polemaetus bellicosus* | Martial Eagle | EN A2cde ; C1, NEST (H) | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |

5 IUCN: LC – Least Concern; VU – Vulnerable; EN – Endangered; CR – Critically Endangered.

| SCIENTIFIC NAME | COMMON NAME | STATUS[5] | COMMENT/PRESENCE |
|---|---|---|---|
| *Circus maurus* | Black Harrier | EN C1+2a(ii), NEST (H, M) | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |
| *Ciconia nigra* | Black Stork | VU A2c; D1, NEST (M) | Outside the scope of this terrestrial assessment. Refer to avifaunal assessment. |
| **Reptiles** | | | |
| *Chersobius boulengeri* | Karoo Padloper | NEST (M), Endangered | Endemic to South Africa, occurring from Bruintjieshoogte in the Eastern Cape to Touwsrivier in the Western Cape; the range in the Northern Cape extends north of Williston in the northwest and beyond Vosburg in the northeast. Occurs in association with dolerite ridges and rocky outcrops of the southern Succulent and Nama Karoo biomes. Not likely to be present due to absence of suitable habitat. |
| **Amphibians** | | | |
| None flagged | - | - | PNCO & ToPS listed species may be present. |
| **Invertebrates** | | | |
| None flagged | | | PNCO & ToPS listed species may be present. |

None of the flagged species were found during the site visits, and there is limited suitable rocky habitat for the Karoo padloper within the site. While the species is known to have a preferred habitat, it does not exclude it from occasionally occurring in less favourable habitats. The alluvial and aquatic habitat, comprising a portion of the site is unlikely suitable due to periodic flooding, which is not suitable for slow moving tortoises.

### *Alien Invasive Species*

Alien invasive species are not prevalent on site other than the occasional Prickly Pear (*Opuntia ficus indica*), which is generally not problematic. Common local weed species are likely to proliferate during and after construction and a suitable weed management strategy must be implemented during construction ands well as an after care period (at least 2 years) during the operational phase.

## 3.1.5 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. Perennial, non-perennial watercourses, and wetlands are present in the wider area and aquatic features, or habitat is present within the site. Any aquatic habitat should be excluded from development.

Portions of the watercourses are braided within the site, creating an extensive alluvial fan landscape surrounding the watercourses. Seasonal flooding may provide aquatic function and ecological processes, as well as bird habitat, which could be altered due to road construction, which could affect alter sediment and flow patterns as well as seasonal flooding patterns, which may in turn alter ecological processes and species composition.

### 3.1.6 Terrestrial Vegetation Sensitivity Assessment

An overall desktop Terrestrial Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

- relative levels of *intactness* in terms of overall loss of indigenous vegetation cover.
- presence, diversity, and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

#### *Intactness*

Three basic classes are differentiated as follows:

- **Low**: > 75 % of original vegetation has been removed or lost; and/or no species of special concern present that are critically endangered, endangered, or endemic with highly localised distribution.
- **Moderate**: 25 - 75 % of original vegetation has been removed/lost; and or presence of species of special concern but not having high conservation status or high levels of endemicity or highly localised distributions.
- **High**: < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemicity and or high conservation status (endangered or critically endangered).

Intactness for the site is moderate to high, with evidence of historical degradation evident, most likely as a result of ongoing historical livestock grazing.

#### *Alien Invasion*

Three classes are differentiated as follows:

- **Low**: no or few scattered individuals.
- **Moderate**: individual clumps of invasives present but cover less than 50% or original area.
- **High**: dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is generally low in near-natural area, disturbed areas often have elevated weed populations.

#### *Degradation*

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

| INTACTNESS | INVASION | | |
|---|---|---|---|
| | LOW | MODERATE | HIGH |
| High | Pristine | Near Pristine | Moderately Degraded |
| Moderate | Near Pristine | Moderately Degraded | Severely Degraded |
| Low | Moderately Degraded | Severely Degraded | Transformed |

Degradation is variable, but generally elevated due to historical overgrazing and since the area has been experiencing an extended drought in recent years. No significant transformation such as cultivated lands are present in abundance, other than a few scattered lands, usually near dwellings or around watercourses. Several small dams are present along drainage lines and several extensive erosion control berms are also present in flatter areas where poor vegetation cover and alluvial/sandy substrate elevate erosion risk. Such erosion management features serve a specific purpose within the degraded landscape and any activity should align with these management processes to minimise ongoing degradation.

## *Overall Sensitivity score*

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

| DEGRADATION | CONSERVATION STATUS | | | |
|---|---|---|---|---|
| | LEAST THREATENED | VULNERABLE | ENDANGERED | CRITICALLY ENDANGERED |
| Severely degraded/ Transformed | Very Low | Low | Moderate | Moderate - High |
| Moderately degraded | Low | Moderate | High | High |
| Ecologically Pristine or near Pristine | Moderate | Moderate - High | High | Very High (No-Go area) |

Refer to Figure 14 for overall sensitivity map and Table 7 for summary of the sensitivity of the respective vegetation units and habitats.

*Table 7: Sensitivity Summary for the site.*

| SPECIES | INTACTNESS | SITE ECOLOGICAL IMPORTANCE ALIEN INVASION | DEGRADATION | STATUS | OVERALL SENSITIVITY |
|---|---|---|---|---|---|
| Riverine Vegetation | High/Moderate | Low | Pristine | LC | High or Very High[6] |
| Intact/ Near Intact Alluvial/ Transitional | Moderate/ High | Low | Pristine | LC | Moderate/High[7] |
| Intact/Near Intact Karroid | Moderate/ High | Low | Near Pristine | LC | Moderate |
| Cultivated/Transformed | Very Low | Low | Transformed | LC | Very Low |

Due to the low conservation status of the site, the general Gamka Karroo vegetation would be deemed to have a low to moderate sensitivity, while niche habitats (such as quartz patches, riverine, alluvial, pans and rocky outcrops) would be deemed to have an elevated (high or very high) sensitivity, which are not common within the specific site, other than the riverine areas.

- High sensitivity areas include confirmed major riverine watercourses with riparian thicket vegetation. These areas are noted to be important ecologically within an arid environment. Must be avoided other than strategic and necessary access road crossings.
- Moderate sensitivity areas include the general natural or near natural Karoid and Alluvial vegetation where national conservation status is not elevated.
- Low sensitivity areas for the purposes of the screening, include all transformed areas including lands or cultivated areas, and/or dwellings.

[6] Riverine and Riparian vegetation has a sensitivity elevated above the surrounding vegetation unit, due to its importance in terms of ecological processes and faunal habitat as well as aquatic processes outside the scope of this assessment.
[7] Alluvial areas have a sensitivity elevated above the surrounding vegetation unit, subject to change based on the findings of the aquatic assessment, specifically relating to ecological processes and risks resulting from the proposed activity.

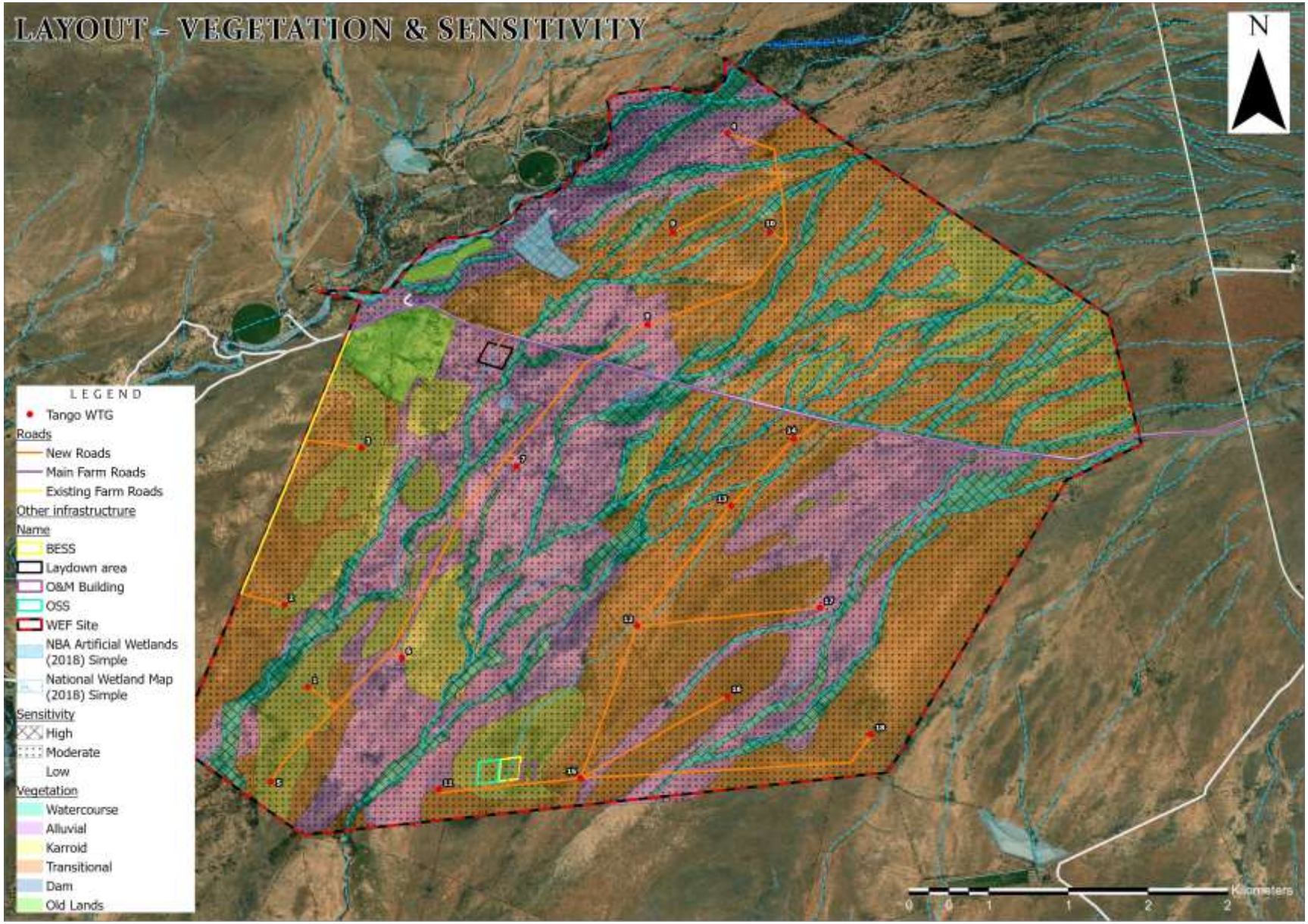


*Figure 14: Overall Terrestrial Biodiversity Sensitivity Map (Tango).*

The sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation.

### 3.1.7 Critical Habitat

Possible Critical Habitat features including the following would require site verification to confirm:

1. Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
2. Criterion 2: Habitat for Endemic or restricted-range species
3. Criterion 3: Habitat for Migratory or congregatory species
4. Criterion 4: Habitat for Highly threatened and/or unique ecosystems
5. Criterion 5: Habitat for Key evolutionary processes

Based on site investigations, no flora Species of Conservation Concern, being endemic or range restricted species or having an elevated conservation status were found to occur. The Karoo padloper is considered to be a habitat specialist, preferring rocky outcrop areas with adequate rocky crevices, but also occasionally occur outside of such habitat. Suitable habitat within the site, specifically the footprint areas are not preferred habitat.

### 3.1.8 No-Go Areas

The high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted the least number of crossings required.

### 3.1.9 Potential Development Footprints

The FE Tango Wind Energy Facility site is suitable for the proposed activity, notwithstanding accommodating the recommended corridors and No-Go areas.

### 3.1.10 Overall Sensitivity and Recommendations

The sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The high sensitivity riverine areas (and buffers, Figure 15) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted to one crossing per watercourse unless no other options are feasible. Additional alluvial corridor buffers have been delineated as per Figure 15, which align with the key braided watercourse network, and must be avoided as far as possible. Watercourse crossings should only traverse these areas where no other alternatives are technically feasible.

As evident in the combined sensitivity map (Figure 16), the optimised layout has largely accommodated the sensitivities and avoided as far as technically possible. Some residual crossings (road to WEF 18), turbines (WEF 1) and the laydown area are within recommended buffers, but these are unlikely to significantly compromise any ecological functioning, since the remainder of the corridors and buffers are not affected.

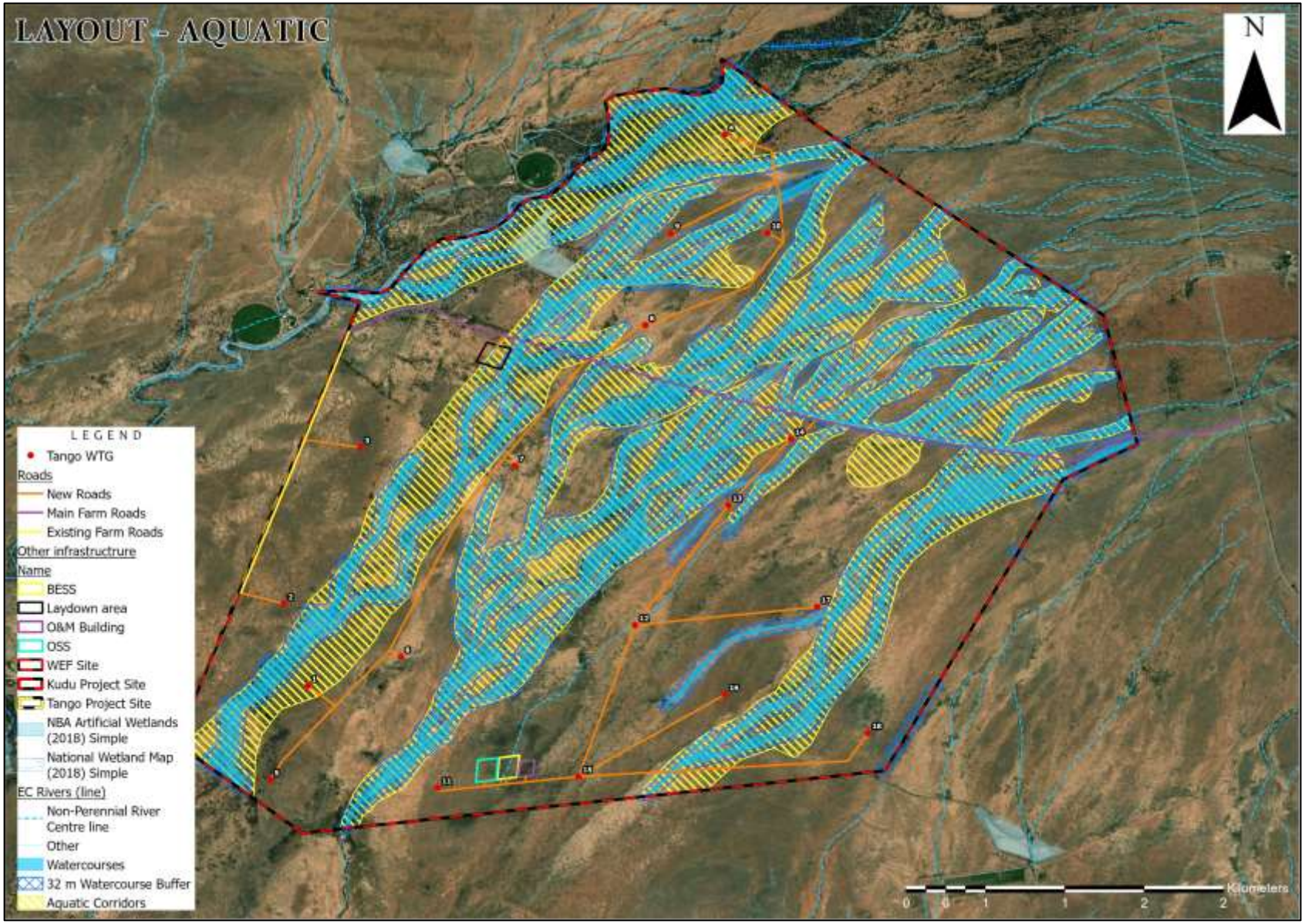


*Figure 15: Mainstem Rivers & Minor Watercourses (Delineated)with 32 m buffers and recommended alluvial corridors – Tango.*

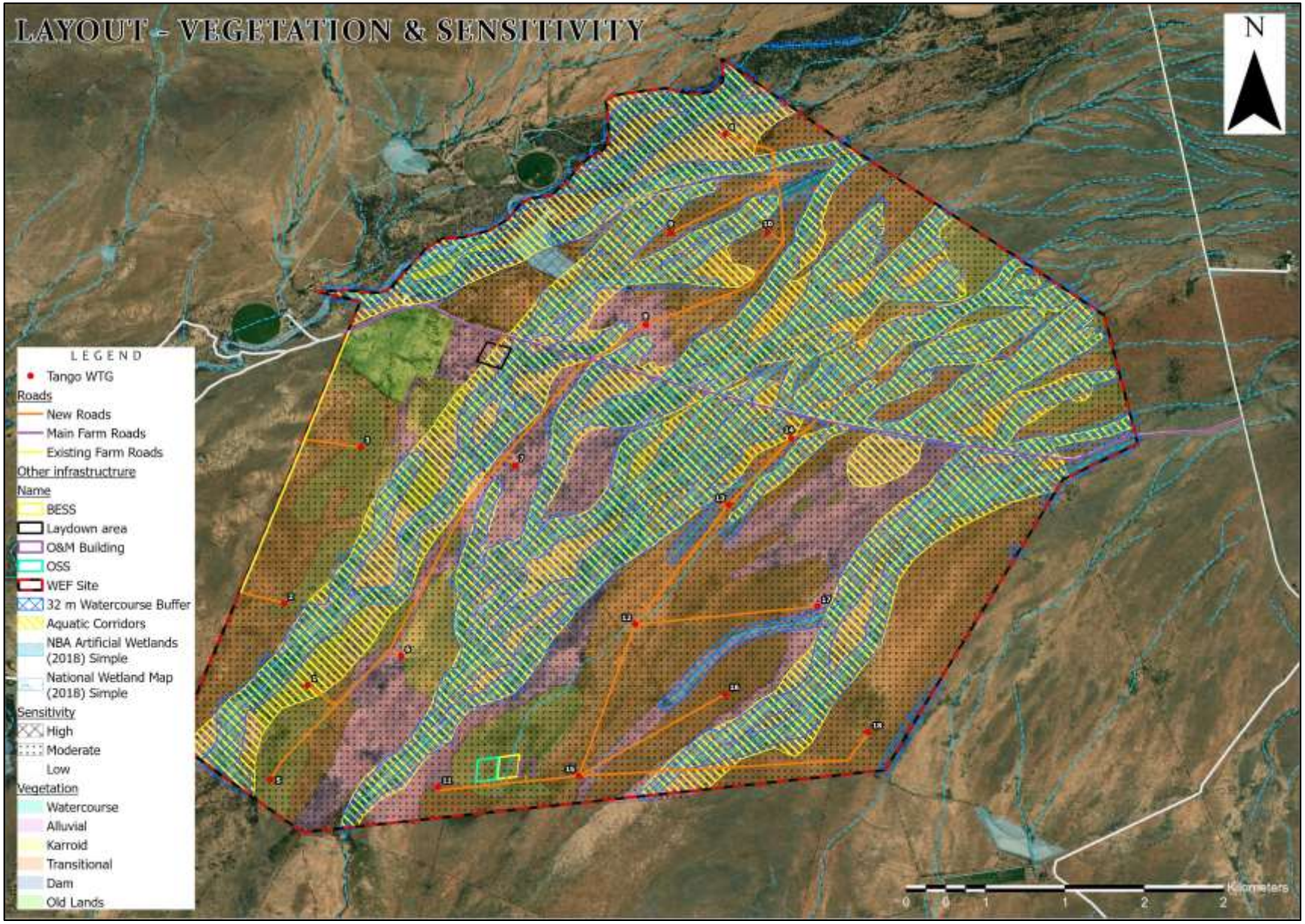


*Figure 16 Terrestrial Vegetation & Sensitivity with recommended Aquatic Buffers and Alluvial Corridors.*

## 3.2 Risks and Potential Impacts to Biodiversity

### 3.2.1 Potential Terrestrial Biodiversity Impacts (Direct)

The main impacts likely to result from the proposed activity are summarised in Table 8 below.

*Table 8: Potential Impacts to Terrestrial Biodiversity*

| IMPACT | Nature of Impact |
|---|---|
| Vegetation | Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. |
| Flora Species | Loss of flora species of special concern during pre-construction site clearing activities. |
| Alien Invasive Species | Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established. |
| Erosion | Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity. |
| Ecological Processes | Disturbances to ecological processes: Activity may result in disturbances to ecological processes. |
| Aquatic and Riparian processes | Aquatic and Riparian processes: Aquatic habitat is present and could be affected. |
| Faunal Habitat | Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species. |
| Faunal Processes | Impacts to faunal processes because of the activity. |
| Faunal Species | Loss of faunal SSC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species. |

### 3.2.2 Impacts and Risks to Irreplaceable Biodiversity Resources

Risks to Irreplaceable Biodiversity Resources is low to medium for the general landscape but potentially high for the quartz patches and other specialised habitat but will require investigation of the potential faunal and flora species that may be present.

### 3.2.3 Residual Risks and Uncertainties

Any terrestrial biodiversity surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times and erratic rainfall. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data and the site surveys were undertaken during periods of favourable seasonal rainfall.

## 3.3 Assessment of Potential Impacts to Biodiversity

### 3.3.1 Assessment of Impact Methodology

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
    - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
    - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
    - medium-term (5–15 years) – assigned a score of 3;
    - long term (> 15 years) - assigned a score of 4; or
    - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
    - 0 is small and will have no effect on the environment.
    - 2 is minor and will not result in an impact on processes.
    - 4 is low and will cause a slight impact on processes.
    - 6 is moderate and will result in processes continuing but in a modified way.
    - 8 is high (processes are altered to the extent that they temporarily cease)
    - 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

- S = (E + D + M)P
- S = Significance weighting
- E = Extent
- D = Duration

- M = Magnitude
- P = Probability

The **significance weightings** for each potential impact are as follows:

- **< 30 points: Low** (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

"***Mitigation***", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible.

"***Cumulative Impact***", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

"***Residual Risk***", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).

## 3.4 Assessment of Impacts

In terms of the impact assessment hierarchy (Avoid, Minimize, Rectify Reduce, Offset), the proposed project underwent an initial sensitivity and screening process in order to inform the preliminary layout. After completion of this initial sensitivity screening, a sensitivity map was provided to the proponent and the layout was refined in order to avoid and minimise sensitivities as far as technically possible. The optimised layout being assessed includes measures to rectify and/or reduce the remining or residual impacts as far as possible. Further refining of the optimised layout may occur during finalisation of the draft reporting as well as during the pre-commencement walkdown once final footprints are determined. **Since the project is not within any critical or sensitive habitat that is under imminent threat, offsets are not anticipated nor included as any recommendations.** The significance before mitigation is this assessed based on a revised layout that has already undergone a refining process to avoid most sensitive habitat pertaining to terrestrial biodiversity.

### 3.4.1 Assessment of Direct Impacts

Assessment of impacts is summarised in the tables below. The rating values as per the criteria described above, as identified during the assessment.

| ***Nature:*** *Permanent or temporary loss of indigenous vegetation cover as a result of the activity.* | | | |
|---|---|---|---|
| **Impact description:** Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint. | | | |
| | **Rating** | **Motivation** | **Significance** |
| ***Prior to Mitigation*** | | | |

| | | | |
|---|---|---|---|
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). | **Low Negative (25)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. | |
| **Probability** | Definite (5) | The possibility of the impact high | |
| ***Mitigation/Enhancement Measures*** | | | |
| ***Mitigation:***<br>• Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place.<br>• Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place.<br>• Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses. | | | |
| ***Post Mitigation/Enhancement Measures*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). | **Low Negative (25)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. | |
| **Probability** | Definite (5) | The possibility of the impact is high | |
| ***Cumulative impacts:***<br>Since the proposed footprint has a minimal area, and is within vegetation units with very low levels of transformation, cumulative impact to terrestrial biodiversity locally and regionally will be negligible. | | | |
| ***Residual Risks:***<br>Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint. | | | |

| | | | |
|---|---|---|---|
| ***Nature:*** *Loss of flora species of conservation concern during pre-construction site clearing activities.* | | | |
| **Impact description:** Species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species and removal will not result in any significant impact to any flora species or population. | | | |
| | **Rating** | **Motivation** | **Significance** |

| | | | |
|---|---|---|---|
| ***Prior to Mitigation*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). | **Low Negative (10)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. While present, species of conservation concern are not prevalent within the WEF footprint. | |
| **Probability** | Improbable (2) | The possibility of the impact is Low. | |
| ***Mitigation/Enhancement Measures*** | | | |
| ***Mitigation:***<br>• A search and rescue would be recommended before construction commences. Any flora search and rescue will likely include a few individuals of widespread, cosmopolitan or common but protected species.<br>• Respective permits to be obtained prior to construction commencing. | | | |
| ***Post Mitigation/Enhancement Measures*** | | | |
| **Duration** | Long term (4) | Clearing of the site will be long term (± 25-year anticipated lifespan). | **Low Negative (10)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | All species are widespread species and removal will not result in any significant impact to any flora species or population. | |
| **Probability** | Probable (2) | The possibility of the impact is Medium. | |
| ***Cumulative impacts:***<br>Since the footprint has a limited area, cumulative impact to flora species locally and regionally will be negligible. All species confirmed present are widespread species and removal will not result in any significant impact to any flora species or population. | | | |
| ***Residual Risks:***<br>Residual risks include possible clearing of areas outside of the proposed footprint, or not relocating any species, but are likely to be negligible. | | | |

| |
|---|
| ***Nature:*** *Loss of fauna species of conservation concern and potential loss of faunal habitat.* |
| **Impact description:** Faunal species of conservation concern are present within the affected area, which could be destroyed during site clearing. All species are widespread species and removal will not result in any significant impact to any flora species or population. Species may include transient fauna species. Activities |

| | | | |
|---|---|---|---|
| associated with site preparation and killing of perceived dangerous fauna, may lead to increased mortalities among faunal species. | | | |
| | **Rating** | **Motivation** | **Significance** |
| ***Prior to Mitigation*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). Fauna species may return to the project site once construction is completed, including transient species. The operation of the site is unlikely to pose any significant risk to such species. | **Low Negative (15)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. | |
| **Probability** | Probable (3) | The possibility of the impact is Medium. | |
| ***Mitigation/Enhancement Measures*** | | | |
| ***Mitigation:***<br>• Blanket clearing of vegetation must be limited to the footprint.<br>• The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.<br>• Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.<br>• Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances.<br>• Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented.<br>• A pre-commencement faunal search and rescue is recommended, but not necessarily required. Respective permits to be obtained beforehand.<br>• No animals are to be harmed or killed during the course of operations including use of snares. | | | |
| ***Post Mitigation/Enhancement Measures*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). Fauna species may return to the project site once construction is completed, | **Low Negative (15)** |

| | | | |
|---|---|---|---|
| | | including transient species. The operation of the site is unlikely to pose any significant risk to such species. | |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. | |
| **Probability** | Probable (3) | The possibility of the impact is Medium. | |

***Cumulative impacts:***

Since the footprint has a limited area, cumulative impact to faunal species locally and regionally will be negligible. All fauna species are widespread species and removal will not result in any significant impact to any fauna species or population. Furthermore, it is likely that fauna species will return to the project footprint once construction is completed, hence cumulative impacts would be negligible. No species having an elevated conservation status were found to be present within the project footprint.

***Residual Risks:***

Residual risks include possible clearing of areas outside of the proposed footprint, killing of perceived harmful fauna during construction or not relocating any species, but are likely to be negligible.

***Nature:*** *Invasion by exotic and alien invasive species could occur as a result of construction.*

**Impact description:** Exotic (weed) and alien invasive species may proliferate during and after construction in disturbed areas. Areas disturbed during construction, having no vegetation cover, including temporary stockpile areas, are often susceptible to invasion by weedy and alien invasive species, which can not only become invasive but also prevent natural flora from becoming established.

| | **Rating** | **Motivation** | **Significance** |
|---|---|---|---|
| ***Prior to Mitigation*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). This risk is highest during and just after construction but can perpetuate for the duration of operations if not adequately managed. | **Low Negative (21)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (2) | The magnitude is generally proportionate to the level of disturbance and how well and quickly mitigation is implemented. | |

| | | | |
|---|---|---|---|
| **Probability** | Probable (3) | The possibility of the impact is Medium. | |
| ***Mitigation/Enhancement Measures*** | | | |
| ***Mitigation:***<br>• Alien species (including alien invasive trees) and weeds must be removed from the site as per CARA/NEMBA requirements.<br>• A suitable weed management strategy to be implemented during construction and operation phases as outlined in the EMPr section of this report. It is imperative that any actions are implemented timeously as once alien and weed species generate seeds, the problem is exacerbated.<br>• After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust. | | | |
| ***Post Mitigation/Enhancement Measures*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). This risk is highest during and just after construction but can perpetuate for the duration of operations if not adequately managed. | **Low Negative (15)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The magnitude is generally proportionate to the level of disturbance and how well and quickly mitigation is implemented. | |
| **Probability** | Probable (3) | The possibility of the impact is Medium. | |
| ***Cumulative impacts:***<br>Disturbed areas are generally subject to weed proliferation, but with implementation of a weed management plan, cumulative impact is potentially negligible. | | | |
| ***Residual Risks:***<br>Residual risks are primarily related to inadequate initial and ongoing implementation of the weed management plan. | | | |

| | | | |
|---|---|---|---|
| ***Nature:*** *Disturbances to ecological processes may occur as a result of the activity.* | | | |
| **Impact description:** Activity may result in disturbances to ecological processes. | | | |
| | **Rating** | **Motivation** | **Significance** |
| ***Prior to Mitigation*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). | **Low Negative (10)** |
| **Extent** | Local (1) | The impact will be restricted to the site and local surrounding area only. | |

| | | | |
|---|---|---|---|
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site. | |
| **Probability** | Improbable (2) | The possibility of the impact is low. | |
| ***Mitigation/Enhancement Measures*** | | | |
| ***Mitigation:***<br>• Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.<br>• Rehabilitation or revegetation should be implemented on completion of construction. | | | |
| ***Post Mitigation/Enhancement Measures*** | | | |
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). Some revegetation to current levels will occur within the WEF footprint once construction is completed. | **Low Negative (10)** |
| **Extent** | Local (1) | The impact will be restricted to the site only. | |
| **Magnitude** | Low (0) | The proposed footprint comprises an insignificant portion of the vegetation unit regionally and extensive areas of natural vegetation are present surrounding the site (to the north and east). | |
| **Probability** | Improbable (2) | The possibility of the impact is Medium | |
| ***Cumulative impacts:***<br>Since the footprint is minimal, as well as being within vegetation units that have extensive coverages, cumulative impact to ecological processes both locally and regionally will be negligible. | | | |
| ***Residual Risks:***<br>Residual risks include possible clearing of natural or near natural vegetation outside of the proposed footprint. | | | |

| | | | |
|---|---|---|---|
| ***Nature:*** *Ecological processes associated with Aquatic and Riparian habitat may be affected by the activity and erosion risk may be elevated.* | | | |
| **Impact description:** *Diversion and increased velocity of surface water flows during construction and operation could alter the hydrological regime and result in changes to water quality as well as loss of riparian vegetation / aquatic habitat. Removal of vegetation cover and soil disturbance during construction may result in some areas being susceptible to soil erosion, in particular during unexpected heavy rainfall.* | | | |
| | **Rating** | **Motivation** | **Significance** |
| ***Prior to Mitigation*** | | | |

| | | | |
|---|---|---|---|
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). Aquatic Features are present, but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations. | **Low Negative (15)** |
| **Extent** | Local (1) | The impact will be restricted to the site and immediate surrounds only. | |
| **Magnitude** | Low (0) | Aquatic Features are present, but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations. | |
| **Probability** | Probable (3) | The possibility of the impact Medium | |

***Mitigation/Enhancement Measures***

***Mitigation:***

- Stormwater discharge into watercourses to be protected against erosion.
- Suitable measures must be implemented in areas that may be susceptible to erosion (such as slopes) and all Any excavations or excavated areas must be protected from erosion.
- Topsoil must be stripped and stockpiled separately and protected from erosion and replaced on completion.
- If natural vegetation re-establishment does not occur natural (bushveld typically regenerates well with minimal intervention), a suitable local grass seed mix must be applied.

***Post Mitigation/Enhancement Measures***

| | | | |
|---|---|---|---|
| **Duration** | Long term (4) | Operation of the site will be long term (± 25-year anticipated lifespan). All aquatic features have been identified and are mostly excluded from the site footprint. | **Low Negative (15)** |
| **Extent** | Local (1) | The impact will be restricted to the site and immediate surrounds only. | |
| **Magnitude** | Low (0) | Aquatic Features are present but have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations. | |
| **Probability** | Probable (3) | The possibility of the impact Medium | |

***Cumulative impacts:***

While the footprint falls within an area having aquatic features, these have largely been avoided via careful layout planning in response to initial sensitivity mapping and recommendations in consultation with both the terrestrial and aquatic specialists. Cumulative impacts locally and regionally will thus be negligible.

***Residual Risks:***

Residual risks include inadequate protection from flooding or erosion (including stockpiles topsoil) as a result of unexpected heavy rainfall, mostly during construction and early after construction is completed (until vegetation cover is established).

The impacts on the terrestrial environment are likely to be minimal and **all** are considered to be low before and after mitigation.

### 3.4.2 Assessment of Indirect Impacts

No Indirect Impacts of concern are anticipated.

### 3.4.3 Assessment of Cumulative Impacts

As per requirements of the EIA Regulations, specialists are required to assess the cumulative impacts. In this regard, please refer to the methodology below that will need to be used for the assessment of Cumulative Impacts.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e. whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

The proposed activity will not result in any unacceptable loss or impact on the site or regionally, regardless of any other projects proposed in the area due to the dispersed and minimal development footprint associated with a Wind Energy Facility development.

| ***Nature:*** *Activity may result in cumulative impacts to terrestrial ecology.* | | |
|---|---|---|
| | **Overall impact of the proposed project considered in isolation** | **Cumulative impact of the project and other projects in the area** |
| ***Extent*** | Low (1) | Low (1) |
| ***Duration*** | Long-term (4) | Long-term (4) |
| ***Magnitude*** | Low (3) | Low (4) |
| ***Probability*** | Probable (3) | Probable (3) |
| ***Significance*** | **Low (24)** | **Low (27)** |
| ***Status (positive or negative)*** | Negative | Negative |
| ***Reversibility*** | High | High |
| ***Irreplaceable loss of resources?*** | No | No |
| ***Can impacts be mitigated?*** | Yes | Yes |
| ***Confidence in findings:*** High. | | |
| ***Mitigation:***<br>Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place. Additional mitigation measures, as described in the tables above, are to be implemented. | | |

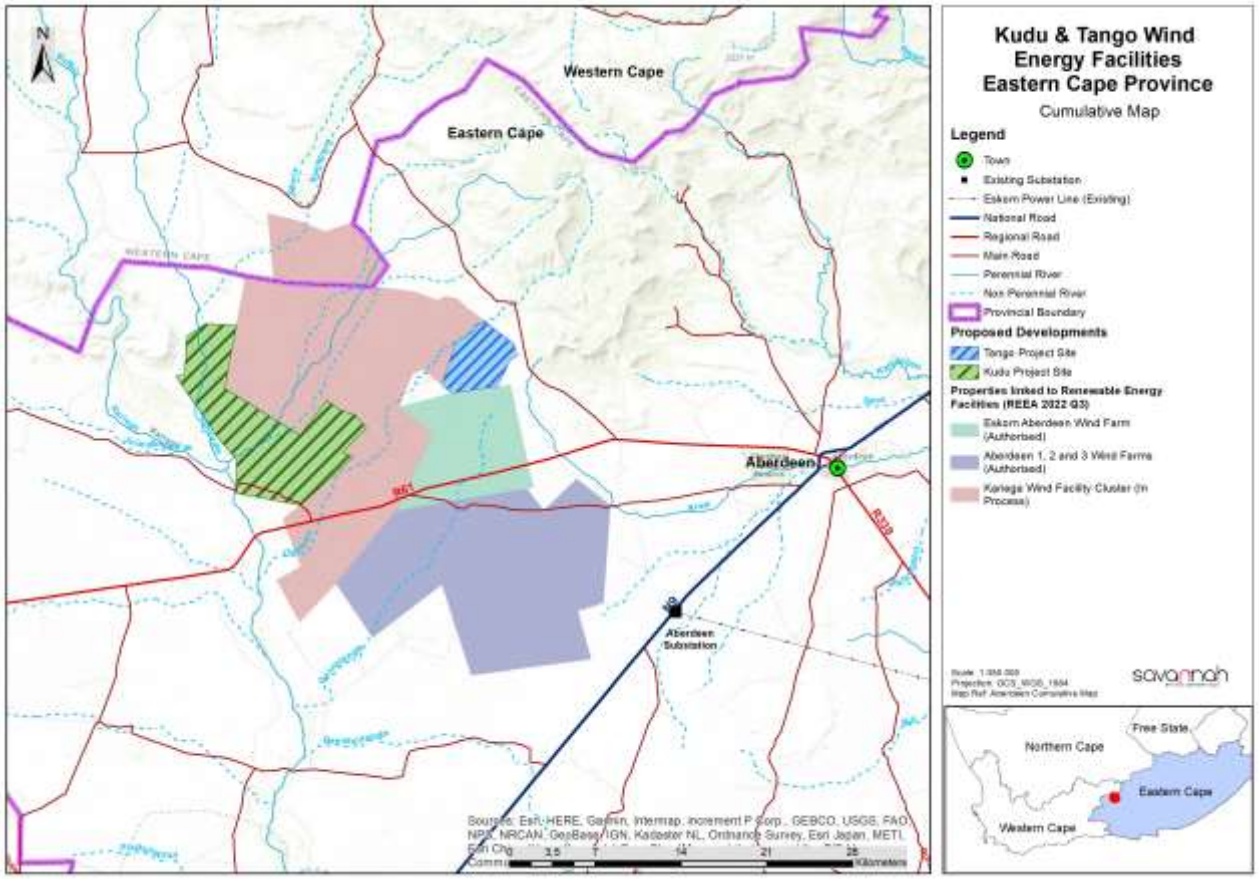


*Figure 17: Map indicating potential cumulative impacts resulting from nearby renewable energy projects.*

The cumulative impacts on the terrestrial environment are likely to be minimal and all are considered to be low after mitigation.

### 3.4.4 Terrestrial Biodiversity Impact Reversibility

Karroid vegetation is generally not resilient and impacts, including hardening of surfaces or removal of topsoil will to some extent be irreversible without high rehabilitation costs. The vegetation represented on site, however, has extensive regional coverage and the local loss as a result of the proposed activity will be negligible.

### 3.4.5 Impacts and Risks to Irreplaceable Biodiversity Resources

The site is situated within vegetation types not having an elevated status (*Least Concern*) and has a limited footprint, hence risks to irreplaceable biodiversity resources will likely be low, in particular as the represented vegetation units and habitats represented are widespread. Several bird species and other faunal species may occasionally traverse the site, but with extensive, unfragmented, similar habitat in the surrounding area, this is not deemed to be irreplaceable, bearing in mind the anticipated limited footprint size. It is thus unlikely that the proposed activity and associated infrastructure would not provide any direct or indirect risk to any species or population.

### 3.4.6 Residual Risks and Uncertainties

No significant residual risks are anticipated, other than a low risk of a plant species not being located during the assessment phase. The final project walkdown that will be undertaken before commencement during finalising of the layout plan, will likely further limit this risk.

### 3.4.7 Implications of Biodiversity Offset Guidelines

Findings of the original terrestrial biodiversity assessment report of relevance can be summarised as follows:

- Affected Vegetation Units: Southern Karoo Riviere & Eastern Lower Karoo
- Ecosystem Threat Status (RLE, 2022): Least Concern & Least Concern with low levels of transformation, no Biodiversity Offset triggered.
- Remaining Ecosystem Extents: 87 & 99 % - no Biodiversity Offset triggered.
- Critical Biodiversity Area 1 & 2: The site overlaps with a small area of CBA 2 along the eastern side. The single turbine and less than 1 km of road that traverses this area will have negligible terrestrial biodiversity risks or impacts and in light of the low levels of transformation and fragmentation within the represented vegetation unit, biodiversity offsets are not deemed to be applicable.
- Ecological Support Area 1 & 2: The site overlaps with a small area of ESA 1 along the eastern side, but not likely to be affected significantly.
- Other legislation: None applicable.

All impacts assessed are deemed to have a low significance after mitigation, hence no Biodiversity Offsets are deemed to be applicable. Refer to Table 9 for respective Biodiversity Offset information summary.

*Table 9: Biodiversity Offset Guidelines Status for vegetation units represented.*

| Ecosystem Type | | Southern Karoo Riviere | Eastern Lower Karoo |
|---|---|---|---|
| ETS[8] | | LC | LC |
| REE[9] (%) | | 87 % | 99 % |
| Transformation Band | | 4 | 4 |
| A. TPC[10] Ratio | NP[11] | | |
| | PP | | |
| | MP | | |
| | WP | | |
| B. RE[12] & EPL[13] Ratios | NP | | |
| | PP | 0 | 0 |
| | MP | | |
| | WP | | |
| C. ETS Ratios | NP | | |
| | PP | 0 | 0 |
| | MP | | |
| | WP | | |
| D. Starting Ratios | NP | | |
| | PP | 0 | 0 |
| | MP | | |
| | WP | | |

[8] Ecosystem Threat Status
[9] Remaining Ecosystem Extent
[10] Threshold of Potential Concern
[11] Not Protected, Poorly Protected, Moderately Protected & Well Protected.
[12] Remaining Extent
[13] Ecosystem Protection Levels

## 3.5 Environmental Management Plan Recommendations

Refer also to Section 7.7: Annexure F: Biodiversity Environmental Management Plan for more comprehensive general recommendations for management of terrestrial biodiversity impacts.

Measures for inclusion in the draft Environmental Management Programme, which should be considered to be conditions of authorisation, are as detailed below, which are listed according to project phases for ease of implementation as follows:

- Pre-Construction Activities
- Bush Clearing and Site Preparation
- Construction Activities
- Site Rehabilitation and Closure
- Operations

### 3.5.1 Planning & Design

| **OBJECTIVE 2: Ensure that relevant permits and site-specific plans are in place to manage impacts on the environment** | | |
|---|---|---|
| **Project component/s** | WEF | |
| **Potential Impact** | Potential impacts include loss of flora and fauna species of conservation concern illegally. | |
| **Activity/risk source** | Pre-construction preparation activities | |
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented before construction in particular before site clearing and grubbing commences in order to be compliant with applicable legislation. | |
| **Mitigation: Action/control** | **Responsibility** | **Timeframe** |
| • Respective flora & fauna permits to be obtained timeously before construction is to commence. | ECO | At least 2 – 3 months before commencement of construction as delays can be expected. |
| **Performance Indicator** | Permits obtained timeously | |
| **Monitoring** | • Ensure flora permits are in place timeously (PNCO only) – allow at least 2 to 3 months before commencement. | |

### 3.5.2 Construction

| **OBJECTIVE 5: Management of dust and emissions and damage to roads** | |
|---|---|
| **Project component/s** | WEF |
| **Potential Impact** | Potential impacts include excessive dust during site clearing which may cause damage to vegetation. |
| **Activity/risk source** | Site operations for duration of life cycle of the project including movement of vehicles on roads and areas cleared of vegetation during site preparation and construction. |

| | | | |
|---|---|---|---|
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented during construction to minimise dust | | |
| **Mitigation: Action/control** | | **Responsibility** | **Timeframe** |
| • Blanket clearing of vegetation must be limited to the site footprint. No clearing outside of footprint to take place, without express approval of ECO and or indicated in approved layout plans.<br>• Site must be clearly demarcated and pegged out before any bush clearing or construction commences. The cleared area should not exceed the required footprint including a reasonable working area.<br>• If required, water spray vehicles should be used to control dust caused by strong winds during activities on the works.<br>• No over-watering of the site or road surfaces.<br>• Wind screens can be used to reduce wind and dust in open areas if required. | | ECO | Duration of construction phase |
| **Performance Indicator** | Construction monitoring of dust | | |
| **Monitoring** | • Monitor for excessive dust (daily). | | |

| **OBJECTIVE 6: Conservation of the existing soil resources within the site and in the adjacent areas** | | | |
|---|---|---|---|
| **Project component/s** | WEF | | |
| **Potential Impact** | Potential impacts include loss of topsoil due to incorrect storage during construction which will negatively affect rehabilitation, as well as erosion due to clearing and construction activities. | | |
| **Activity/risk source** | Excessive dust due to poor dust management | | |
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented during construction to minimise loss of soil resources. | | |
| **Mitigation: Action/control** | | **Responsibility** | **Timeframe** |
| • Topsoil shall be removed from all areas where physical disturbance of the surface will occur.<br>• All available topsoil shall be removed after consultation with the botanist and/or ECO prior to commencement of any operations and sufficient topsoil must be stored for later use during decommissioning.<br>• The removed topsoil shall be stored on high ground within the site footprint outside the 1:100 flood level within demarcated areas.<br>• Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.<br>• The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds if necessary. | | ECO | Duration of construction |

| | | |
|---|---|---|
| • A suitable weed management strategy to be implemented on topsoil stockpiles. | | |
| **Performance Indicator** | Excessive dust is not problematic | |
| **Monitoring** | • Monitoring of topsoils stockpiles for erosion and weeds (monthly and after significant rainfall events) | |

**OBJECTIVE 7: Minimise impact on Sensitive areas and plant species**

| | | |
|---|---|---|
| **Project component/s** | WEF | |
| **Potential Impact** | Potential impacts include excessive loss of vegetation and species of conservation concern and habitat outside of footprint. | |
| **Activity/risk source** | Site clearing activities (clearing and grubbing) | |
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented on commencement of construction in particular site clearing and grubbing. | |
| **Mitigation: Action/control** | **Responsibility** | **Timeframe** |
| • Blanket clearing of vegetation must be limited to the site footprint. No clearing outside of footprint to take place, without express approval of ECO and or indicated in approved layout plans.<br>• Site must be clearly demarcated and pegged out before any bush clearing or construction commences. The cleared area should not exceed the required footprint including a reasonable working area.<br>• Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses.<br>• Search and rescue operations for Species of Conservation Concern *must* be undertaken before the commencement of site clearing activities.<br>• It is important that clearing activities are kept to the minimum and take place in a phased manner. This minimises wind and water erosion of the cleared areas.<br>• Workers are NOT allowed to collect any flora. All flora remain the property of the landowner and *must* not be disturbed, upset or used without their expressed consent.<br>• It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.<br>• No domestic animals are permitted on the sites.<br>• Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO. | ECO | Duration of site clearing and grubbing activities. |
| **Performance Indicator** | Excessive clearing outside of site footprint does not occur | |
| **Monitoring** | • Check delineated footprints area not exceeded (daily). | |

**OBJECTIVE 8: Protection of terrestrial fauna**

| | | | |
|---|---|---|---|
| **Project component/s** | WEF | | |
| **Potential Impact** | Potential impacts include faunal species mortalities, erosion and stormwater management. | | |
| **Activity/risk source** | Construction activities may pose a risk to fauna | | |
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented before and during construction in particular before and during site clearing and grubbing. | | |
| **Mitigation: Action/control** | | **Responsibility** | **Timeframe** |
| • Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of Conservation Concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.<br>• Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances.<br>• No animals are to be harmed or killed during the course of operations.<br>• It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas<br>• Workers are NOT allowed to collect or snare any faunal species. All fauna remain the property of the landowner and *must* not be disturbed, upset or used without their expressed consent. | | ECO | Duration of construction on site. |
| **Performance Indicator** | Faunal mortalities are not excessive | | |
| **Monitoring** | • Regular checks on trenches and excavations for trapped animals (daily)<br>• Regular checks of fences for snares (monthly) | | |

| | |
|---|---|
| **OBJECTIVE 12: Appropriate handling and management of waste** | |
| **Project component/s** | WEF |
| **Potential Impact** | Terrestrial Biodiversity Impacts relating to improper or inadequate waste management procedures. |
| **Activity/risk source** | Site clearing and construction activities |

| | | | |
|---|---|---|---|
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented to minimise waste and effectively manage waste. | | |
| **Mitigation: Action/control** | | **Responsibility** | **Timeframe** |
| • Excavations may not be used for the dumping of construction wastes.<br>• Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.<br>• All waste to be colelcted in an appropriate manner and disposed of correctly at the respective waste disposal facilities. | | ECO | Duration of construction. |
| **Performance Indicator** | Waste is effectively managed | | |
| **Monitoring** | • Ensure working plant has no oil or hydraulic leaks (daily & weekly).<br>• Ensure all waste is disposed of correctly and not buried in any excavations. | | |

| | | | |
|---|---|---|---|
| **OBJECTIVE 15: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed** | | | |
| **Project component/s** | WEF | | |
| **Potential Impact** | Potential impacts include erosion, poor vegetation cover and alien invasive and weed regeneration | | |
| **Activity/risk source** | Site rehabilitation activities are not implemented in correct manner or timeously. | | |
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented completion of construction relating to rehabilitation | | |
| **Mitigation: Action/control** | | **Responsibility** | **Timeframe** |
| • A suitable weed management strategy to be implemented in construction phase.<br>• Alien trees and weeds must be removed from the site as per CARA/NEMBA requirements.<br>• Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed.<br>• Any topsoil stripped during site preparation must be replaced on completion in areas where rehabilitation is required.<br>• If natural vegetation re-establishment does not occur, a suitable grass must be applied.<br>• Stormwater discharge into watercourses to be protected against erosion. | | ECO | Completion of phased construction into operational phase for duration of aftercare period on completion of construction (2 years recommended) |
| **Performance Indicator** | Adequate vegetation cover is achieved and erosion is efectibely managed with no serious erosion incidents | | |
| **Monitoring** | • Check quality of topsoil and weed free.<br>• Check for weed regrowth and manage timeously, before seed is set (monthly). | | |

| | |
|---|---|
| | • If natural revegetation does not occur, reseeding may be required (monitor for 6 – 12 months after completion of construction (depending on time of year that construction is completed, as regrowth will be poor over winter months) |

### 3.5.3 Operation

| **OBJECTIVE 15: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed** | | |
|---|---|---|
| **Project component/s** | WEF | |
| **Potential Impact** | Potential impacts include erosion, poor vegetation cover and alien invasive and weed regeneration | |
| **Activity/risk source** | Site rehabilitation activities commencing during end phases of construction and continuing into operational phase | |
| **Mitigation: Target/Objective** | To ensure that mitigations are implemented after construction relating to rehabilitation of disturbed areas. | |
| **Mitigation: Action/control** | **Responsibility** | **Timeframe** |
| • A suitable weed management strategy to be implemented in construction phase.<br>• Alien trees and weeds must be removed from the site as per CARA/NEMBA requirements on an ongoing basis during operational phase.<br>• Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed.<br>• If natural vegetation re-establishment does not occur, a suitable grass must be applied.<br>• Stormwater discharge into watercourses to be protected against erosion. | ECO | Duration of aftercare period on completion of construction (recommended 2 years) |
| **Performance Indicator** | Rehabilitation and vegetation regrowth is acheived in disturbed areas | |
| **Monitoring** | • Check for weed regrowth and manage timeously, before seed is set (quarterly during 2 year aftercare period then annually for duration of operations).<br>• If natural revegetation does not occur duirng aftetrcare period, reseeding may be required (monitor for 6 – 12 months after completion of construction, depending on time of year that construction is completed, as regrowth will be poor over winter months) | |

## 3.6 Findings and Recommendations

## 3.7 Summary of Findings

The proposed activity will require the clearing of more than 300 m$^2$ of indigenous vegetation within a designated CBA area, depending on final WEF and access road configuration, and will require clearance of greater than 1 Ha of indigenous vegetation as well as activities in watercourses to construct access road crossings, hence as a minimum a Basic Assessment application process would be triggered. Due to the scale of the project and largely natural to near natural composition of the site, more than 20 Ha of

indigenous vegetation will also require clearing. However, as the site is situated within a Renewable Energy Development Zone (REDZ), a Full Scoping & EIA process will not be required, as a Basic Assessment process can be followed.

The DFFE screening tool identifies Very High & Low Terrestrial Biodiversity, Medium & High Animal Species, Medium Plant Species, Low & Very High Aquatic and Medium & Low Agricultural Sensitivities within or in proximity to the site.

The vegetation units present, Southern Karoo Riviere, Eastern Lower Karoo and Gamka Karoo, have a *Least Concern* status, indicating that less than 40% has been transformed regionally and there will likely be minimal loss or disruptions to ecological functioning. Development of a portion of the site will thus not significantly affect conservation targets for the affected vegetation unit, as long as at least 24 % (i.e., the conservation target) is retained in a manner that supports connectivity.

A small portion of the site is designated ESA 1 and CBA 2 along the eastern boundary. In terms of Regional Planning guidelines, the proposed development footprint would be feasible if it minimises the loss of designated CBA areas and minimises fragmentation of ESA areas, which is achieved in the optimised layout. The residual impact as a result of the proposed optimised layout will be negligible, as only one turbine and less than 1 km of road falls within a designated CBA area. Conservation targets for the vegetation units will not be affected due to the extensive regional coverage and small development footprint of the proposed WEF. Biodiversity Offsets will NOT be triggered by the proposed activity based on the most recent Biodiversity Offset Guidelines as the residual impact after mitigation is deemed to be low.

The most significant potential risk to ecological processes, includes changes to water and sediment flow in the alluvial areas, as a result of fragmentation (or localised damming) as a result of construction of raised access roads, which could result in long-term changes to species composition and ecological processes. It is recommended that the proposed alluvial corridors are maintained with minimal roads bisecting, or in particular WEF footprint within, in order to minimise disruptions to alluvial connectivity and to minimise impact to flow and sediment processes. Measures such as culverts along roads may be required to facilitate natural water movement patterns. These risks have largely been mitigated through the layout revisions based on the preliminary sensitivity mapping and recommendations. Residual impacts in these areas is likely to be negligible.

Several aquatic features or aquatic functional zones are present including an extensive braided watercourse network, which could provide some technical challenges due to seasonal flooding. These areas have been accommodated on the FE Tango Wind Energy Facility site, via the layout revisions based on the preliminary sensitivity mapping and recommendations. Any footprint within these areas will likely require careful planning in order to minimise changes to flows which could alter species composition and affect ecological processes. Furthermore, in general the braided watercourse areas align with the ESA designations. As a minimum any roads traversing these alluvial areas must accommodate lateral flows (interconnectivity) of water and sediment between watercourses and alluvial area where seasonal flooding occurs. It is noted that there is significant modification to natural flow paths present due to berms and other water diversion features that have been constructed on the broader site to manage flowing and runoff. Only the higher order, well defined watercourses have been delineated, smaller drainage lines and channels have not been delineated, due to the large number within the very flat

alluvial landscape. In terms of terrestrial composition and processes the minor watercourses are not a significant priority, and would be deemed an acceptable loss, provided measures are implemented to accommodate flows as mentioned above. This could include box (or other) culverts under raised access roads to allow lateral movement of water and to minimis localised flooding and/or drying out.

The sensitivities indicated are based on a hierarchical approach, with high being the most sensitive and low being the least sensitive. The recommended approach will be to avoid higher sensitivity areas as far as is technically possible and prioritise moderate and lower sensitivity areas. The high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted to one crossing per watercourse unless no other options are feasible. Additional alluvial corridor buffers have been delineated as per Figure 15, which align with the key braided watercourse network, and must be avoided as far as possible. Watercourse crossings should only traverse these areas where no other alternatives are technically feasible.

The site verification determined that the site is generally typical of the expected vegetation units with species composition comprising a grassy community as well as a rocky community within the Karroid areas, with predominantly grassy vegetation in lower lying areas, but with overlap in species occurrence. From initial observations, rocky outcrop areas do not appear to be particularly diverse, and no specific species of conservation concern were identified, although additional seasonal sampling would be required. It should be noted that the species of concern represented are potentially suited to relocation, should such be required.

Several endangered and/or critically endangered species are flagged for the site, however none were observed during the site visits. Based on site observations, suitable habitat is limited (i.e., areas outside of alluvial areas). Generally, the most likely species are succulent species, and these would potentially be amenable to relocation if required. It is unlikely that the dispersed natural of the project development footprint will pose any significant risk and can be confirmed during the final walkdown before construction. The Karoo National Park which overlaps with a designated Important Bird Area (IBA), the Karoo National Park IBA, is situated more than 70 km to the north-east of the site and is thus not likely to pose any risk of significance. Preferred habitat for the Karoo Padloper tortoise is not prevalent within the site, or the proposed project area. It is not anticipated that the risk to any Karoo Padloper tortoise will be significant, although a final inspection should form part of the final walkdown processes before final plans are approved and construction commences.

The site sensitivity (Figure 14) can be summarised as follows:

- High sensitivity areas include confirmed major riverine watercourses with riparian thicket vegetation. These areas are noted to be important ecologically within an arid environment. Must be avoided other than strategic and necessary access road crossings.
- Moderate sensitivity areas include the general natural or near natural Karoid and Alluvial vegetation where national conservation status is not elevated.
- Low sensitivity areas for the purposes of the screening, include all transformed areas including lands or cultivated areas, and/or dwellings.
- No-go areas –specific no go-areas include the high sensitivity riverine areas (and buffers) should be avoided in terms of any footprints other than for access road crossings, which should also prioritise

crossing watercourses where riverine thicket is absent rather than removing riverine or riparian thicket vegetation. Crossings over riverine corridors should be minimised and restricted the least number of crossings required.

- Cumulative impacts to terrestrial biodiversity due to the development of the site, are likely to be negligible due to the extensive local and regional coverage of the represented vegetation units as well as the limited footprint of the proposed WEF.

Due to having a low conservation status, the vegetation units present would in principle provide a suitable footprint for the proposed activity, bearing in mind the potential elevated sensitivity of the alluvial and floodplain areas, where additional guidance from the aquatic assessment will be required regarding the aquatic processes at play and measures that will be required to accommodate the respective ecological processes and connectivity. Fill material will be required to accommodate the access roads and WEF footprints, which could indirectly alter flooding and movement of sediments. This could result in more widespread ecological changes as well as changes in both flora and fauna species composition. The revised layout has largely avoided these sensitivities and residual impacts will be negligible.

All impacts are assessed to be of ***low significance after mitigation*** and specific mitigation measures are outlined in Section 3.5: Environmental Management as well as in the general Environmental Management Plan (Section 7.7: Annexure F: Biodiversity Environmental Management Plan).

Based on the site assessment, the proposed FE Tango Wind Energy Facility site will be amenable to the proposed activity, providing the recommended watercourses buffers (other than for access roads) as well as avoiding significant footprints within the suggested alluvial corridors (other than minimal access road crossings) are adhered to. Where any WEF footprint is in proximity to a buffer or watercourse, the laydown area portion should be orientated away from the watercourse/buffer rather than towards. Based on the assessed optimised layout, these requirements have largely been accommodated as far as technically possible.

After completion of this initial sensitivity screening, a sensitivity map was provided to the proponent and the layout was refined in order to avoid and minimise sensitivities as far as technically possible. The optimised layout that has been assessed includes mitigation strategy measures to rectify and/or reduce the remining or residual impacts as far as possible. Further refining of the optimised layout is likely during finalisation of the Basic Assessment reporting, as well as during the pre-commencement walkdown once final footprints are determined and detailed layouts compiled.

## 3.8 Implementation Plans

### 3.8.1 Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- A pre-commencement flora relocation is recommended as several TNCO protected species are present within the proposed footprint.
- A pre-commencement fauna relocation is recommended. Several burrowing faunal species are present and will allow for relocation of less mobile species, although most faunal species in proximity are likely to vacate the area once earth moving equipment commences clearing and construction, however some species may require manual relocation.

- Topsoil must be stripped and stockpiled for replacement after construction of the site. Additional measures should be implemented to stabilise eroded areas where necessary.

### 3.8.2 Rehabilitation and Landscaping Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable local grass seed mix, usually available from a local farmer co-op, if deemed to be required as vegetation is likely to re-establish without input, as is typical in Karoid areas. Species composition of such grass seed mixes is best determined by what local indigenous species are locally, cost effectively and readily available. A mix of several species is recommended rather than a single grass species.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.

### 3.8.3 Open Space Management/Conservation Plan

None are applicable for this project.

### 3.8.4 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of the site for maintenance/replacement of defective components and repairs where applicable, which may include road, turbine footprint and buried infrastructure maintenance and excavation or infill within watercourse crossings.

All measures of this report, including the EMPr should be adhered for any such maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

# 4 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:

- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

# 5 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response
- Spill management and incident response

- Waste management and incident response
- Response to emergency site shutdown, including labour and protest actions.

# 6 Stakeholder Engagement

Possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

No Stakeholder Engagement was conducted specifically by the Specialist. Stakeholder Engagement is undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report.

# 7 Appendices

## 7.1 Appendix A: References

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## 7.2 Appendix B: Site photos





















































## 7.3 Annexure C: Flora and Fauna Species Lists

### 7.3.1 Flora

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| *Acacia karroo* | Fabaceae | LC | NKl 1, NKl 2, AZi 6 |
| *Adromischus fallax* | Crassulaceae | Rare | NKu 2 |
| *Adromischus humilis* | Crassulaceae | LC | NKu 2 |
| *Albuca setosa* | Hyacinthaceae | LC, PNCO | NKl 2, NKu 2 |
| *Aloe broomii* | Asphodelaceae | LC | NKu 2 |
| *Aloe chlorantha* | Asphodelaceae | NT D2 | NKu 2 |
| *Aloinopsis rubrolineata* | Aizoaceae | LC, PNCO | NKl 2 |
| *Amphiglossa callunoides* | Asteraceae | VU | AZi 6 |
| *Amphiglossa triflora* | Asteraceae | LC | NKu 2 |
| *Androcymbium albomarginatum* | Colchicaceae | LC | NKu 2 |
| *Anisodontea malvastroides* | Malvaceae | Rare | NKu 2 |
| *Anthospermum rigidum subsp. Pumilum* | Rubiaceae | LC | Gh 1 |
| *Aptosimum elongatum* | Scrophulariaceae | LC | NKl 2, NKu 2 |
| *Aptosimum indivisum* | Scrophulariaceae | LC | NKl 1 |
| *Aptosimum spinescens* | Scrophulariaceae | LC | NKu 2 |
| *Aridaria noctiflora subsp. straminea* | Aizoaceae | LC, PNCO | NKl 1 |
| *Aristida adscensionis* | Poaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Aristida congesta* | Poaceae | LC | NKl 1, NKl 2, Gh 1, NKu 2 |
| *Aristida diffusa* | Poaceae | LC | NKl 1, Gh 1, NKu 2 |
| *Asparagus burchellii* | Asparagaceae | LC | NKl 1 |
| *Asparagus mucronatus* | Asparagaceae | LC | NKu 2 |
| *Asparagus retrofractus* | Asparagaceae | LC | NKu 2 |
| *Asparagus striatus* | Asparagaceae | LC | NKl 2, AZi 6, NKu 2 |
| *Asparagus suaveolens* | Asparagaceae | LC | NKl 2, NKu 2 |
| *Asplenium cordatum* | Aspleniaceae | LC | NKu 2 |
| *Astroloba foliolosa* | Asphodelaceae | LC | NKl 2 |
| *Atriplex semibaccata var. appendiculata* | Chenopodiaceae | LC | Gh 1 |
| *Ballota africana* | Lamiaceae | LC | AZi 6 |
| *Barleria pungens* | Acanthaceae | LC | NKl 2 |
| *Bassia salsoloides* | Chenopodiaceae | LC | AZi 6 |
| *Berkheya pinnatifida* | Asteraceae | LC | Gh 1 |

[14] IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species.

[15] NKl 1 - Gamka Karoo, NKl 2 - Eastern Lower Karoo, AZi 6 - Southern Karoo Riviere, NKu 2 - Upper Karoo Hardeveld & Gh 1 - Karoo Escarpment Grassland

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| *Blepharis capensis* | Acanthaceae | LC | NKl 2 |
| *Blepharis mitrata* | Acanthaceae | LC | NKl 1, NKl 2 |
| *Boophone disticha* | Amaryllidaceae | LC, PNCO | Gh 1, NKu 2 |
| *Cadaba aphylla* | Capparaceae | LC | NKl 1, NKl 2, AZi 6, NKu 2 |
| *Carissa haematocarpa* | Apocynaceae | LC | NKl 2, AZi 6 |
| *Cenchrus ciliaris* | Poaceae | LC | NKl 1, AZi 6, NKu 2 |
| *Chamaesyce inaequilatera* | Euphorbiaceae | LC | NKl 1, NKl 2 |
| *Chasmatophyllum nelii* | Aizoaceae | LC, PNCO | NKl 2 |
| *Chasmatophyllum stanleyi* | Aizoaceae | LC, PNCO | NKl 1 |
| *Cheilanthes bergiana* | Pteridaceae | LC | Gh 1, NKu 2 |
| *Cheilanthes hirta* | Pteridaceae | LC | Gh 1 |
| *Chloris virgata* | Poaceae | LC | NKl 2 |
| *Chrysocoma ciliata* | Asteraceae | LC | NKl 1, NKl 2, Gh 1, NKu 2 |
| *Cineraria arctotidea* | Asteraceae | LC | NKu 2 |
| *Cineraria polycephala* | Asteraceae | LC | NKu 2 |
| *Cliffortia arborea* | Rosaceae | VU A2cd; C2a(i) | Gh 1 |
| *Cliffortia montana* | Rosaceae | NEST (M), Rare | A habitat specialist known from two disjunct areas in the Western and Eastern Cape. A very poorly known and rarely collected species with an unusually disjunct distribution. It is possibly overlooked and more common and widespread than collections indicate. No threats known, although inappropriate fire management could negatively affect this species. Possibly present, unconfirmed. |
| *Convolvulus sagittatus* | Convolvulaceae | LC | NKl 2, Gh 1 |
| *Crassula barbata subsp. broomii* | Crassulaceae | DDT | NKu 2 |
| *Crassula corallina* | Crassulaceae | LC, PNCO | NKl 2 |
| *Crassula muscosa* | Crassulaceae | LC, PNCO | NKl 1, NKl 2 |
| *Cylindrophyllum calamiforme* | Aizoaceae | LC, PNCO | NKl 2 |
| *Cymbopogon pospischilii* | Poaceae | LC | Gh 1 |
| *Cynodon dactylon* | Poaceae | LC | Gh 1 |
| *Cynodon incompletus* | Poaceae | LC | NKl 2, AZi 6, Gh 1, NKu 2 |
| *Cyperus marginatus* | Cyperaceae | LC | AZi 6 |
| *Delosperma congestum* | Aizoaceae | LC, PNCO | Gh 1 |
| *Delosperma gramineum* | Aizoaceae | LC, PNCO | Gh 1 |
| *Delosperma robustum* | Aizoaceae | LC, PNCO | NKu 2 |
| *Dianthus caespitosus subsp. caespitosus* | Caryophyllaceae | LC | Gh 1, NKu 2 |
| *Diascia capsularis* | Scrophulariaceae | LC | Gh 1 |
| *Dicoma capensis* | Asteraceae | LC | NKl 1 |
| *Dierama grandiflorum* | Iridaceae | NEST (M), EN B1ab(iii), PNCO | An Eastern Cape endemic (EOO 3444 km²), known from two confirmed locations and possibly still extant at three other locations where it is known from historical records. It is declining due to ongoing habitat degradation. |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| | | | Range is from Graaff-Reinet and Somerset East. An extremely rare and localized endemic known from less than 10 collections. Recent observations of subpopulations on the Bosberg indicate that plants occur in small, sparsely scattered clumps of fewer than 100 plants. Possibly present, Not recorded. |
| *Digitaria argyrograpta* | Poaceae | LC | NKl 1 |
| *Digitaria eriantha* | Poaceae | LC | NKu 2 |
| *Dimorphotheca zeyheri* | Asteraceae | LC | Gh 1 |
| *Diospyros austro-africana* | Ebenaceae | LC | Gh 1, NKu 2 |
| *Diospyros lycioides* | Ebenaceae | LC | AZi 6 |
| *Drimia anomala* | Hyacinthaceae | LC, PNCO | NKl 2 |
| *Drimia intricata* | Hyacinthaceae | LC, PNCO | NKl 1, NKl 2, NKu 2 |
| *Drosanthemum lique* | Aizoaceae | LC, PNCO | NKl 1, NKl 2, AZi 6, NKu 2 |
| *Drosanthemum subspinosum* | Aizoaceae | DDT, PNCO | NKl 2 |
| *Duvalia modesta* | Apocynaceae | LC | Gh 1 |
| *Ehretia rigida subsp. rigida* | Boraginaceae | LC | NKu 2 |
| *Ehrharta calycina* | Poaceae | LC | Gh 1, NKu 2 |
| *Elionurus muticus* | Poaceae | LC | Gh 1 |
| *Elytropappus rhinocerotis* | Asteraceae | LC | Gh 1 |
| *Enneapogon desvauxii* | Poaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Enneapogon scaber* | Poaceae | LC | NKl 1, NKu 2 |
| *Enneapogon scoparius* | Poaceae | LC | NKu 2 |
| *Eragrostis chloromelas* | Poaceae | LC | Gh 1 |
| *Eragrostis curvula* | Poaceae | LC | NKl 2, Gh 1, NKu 2 |
| *Eragrostis homomalla* | Poaceae | LC | NKl 1 |
| *Eragrostis lehmanniana* | Poaceae | LC | NKl 1 NKl 2, Gh 1, NKu 2 |
| *Eragrostis nindensis* | Poaceae | LC | NKu 2 |
| *Eragrostis obtusa* | Poaceae | LC | NKl 1, NKl 2, Gh 1, NKu 2 |
| *Eragrostis procumbens* | Poaceae | LC | NKu 2 |
| *Erica caespitosa* | Ericaceae | LC, PNCO | Gh 1 |
| *Erica caffrorum var. caffrorum* | Ericaceae | LC, PNCO | Gh 1 |
| *Erica passerinoides* | Ericaceae | NEST (M), EN B1ab(iii), PNCO | This species is known from between three and five locations and has an extent of occurrence (EOO) of 4312 km². It is continuing to decline due to expanding forestry plantations and alien invasive encroachment. This species is endemic to the mountains of the Eastern Cape interior, where it is known from a few scattered subpopulations in the Sneeuberg in the Koudeveld Mountains, Katberg Pass and Cata Forest Reserve. It occurs on south-facing slopes in karoo-grassland ecotones. The Kamdeboo Mountain subpopulation is large and healthy, with two distinct large stands |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| | | | having been monitored on different summits within the range in the past 10 years. Possibly present, Not recorded. |
| *Erica woodii* | Ericaceae | LC, PNCO | Gh 1 |
| *Eriocephalus ericoides subsp. ericoides* | Asteraceae | LC | NKl 1, NKl 2, NKu 2 |
| *Eriocephalus eximius* | Asteraceae | LC | Gh 1 |
| *Eriocephalus microphyllus var. pubescens* | Asteraceae | LC | NKl 1 |
| *Eriocephalus spinescens* | Asteraceae | LC | NKl 1, NKu 2 |
| *Euclea undulata* | Ebenaceae | LC | AZi 6 |
| *Eucomis autumnalis subsp. autumnalis* | Hyacinthaceae | NE, PNCO | Gh 1 |
| *Euphorbia clavarioides var. clavarioides* | Euphorbiaceae | LC | Gh 1 |
| *Euphorbia coerulans* | Euphorbiaceae | LC | NKl 2 |
| *Euphorbia ferox* | Euphorbiaceae | LC | NKl 2 |
| *Euphorbia mauritanica* | Euphorbiaceae | LC | Gh 1 |
| *Euryops annae* | Asteraceae | LC | Gh 1, NKu 2 |
| *Euryops anthemoides* | Asteraceae | LC | NKl 2 |
| *Euryops anthemoides subsp. astrotrichus* | Asteraceae | LC | Gh 1 |
| *Euryops candollei* | Asteraceae | LC | Gh 1, NKu 2 |
| *Euryops dentatus* | Asteraceae | LC | Gh 1 |
| *Euryops empetrifolius* | Asteraceae | LC | NKu 2 |
| *Euryops floribundus* | Asteraceae | LC | Gh 1 |
| *Euryops lateriflorus* | Asteraceae | LC | NKu 2 |
| *Euryops nodosus* | Asteraceae | LC | NKu 2 |
| *Euryops oligoglossus subsp. oligoglossus* | Asteraceae | LC | Gh 1 |
| *Euryops petraeus* | Asteraceae | LC | NKu 2 |
| *Euryops trilobus* | Asteraceae | LC | Gh 1 |
| *Eustachys paspaloides* | Poaceae | LC | Gh 1 |
| *Faucaria bosscheana* | Aizoaceae | LC, PNCO | NKu 2 |
| *Felicia filifolia subsp. filifolia* | Asteraceae | LC | NKl 1, Gh 1, NKu 2 |
| *Felicia lasiocarpa* | Asteraceae | LC | NKl 1 |
| *Felicia muricata* | Asteraceae | LC | NKl 1, NKl 2, NKl 2, Gh 1, NKu 2 |
| *Felicia muricata subsp. cinerascens* | Asteraceae | LC | NKl 1 |
| *Fingerhuthia africana* | Poaceae | LC | NKl 1, NKu 2 |
| *Galenia fruticosa* | Aizoaceae | LC, PNCO | NKl 1 |
| *Galenia glandulifera* | Aizoaceae | NT B1ab (iii,iv,v), PNCO | NKl 1 |
| *Galenia sarcophylla* | Aizoaceae | LC, PNCO | NKl 1 |
| *Galenia secunda* | Aizoaceae | LC, PNCO | NKl 1, NKl 2 |
| *Galium capense subsp. capense* | Rubiaceae | LC | Gh 1 |
| *Garuleum bipinnatum* | Asteraceae | LC | NKl 1 |
| *Garuleum latifolium* | Asteraceae | LC | NKl 1, NKl 2, NKu 2 |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| *Gazania krebsiana* | Asteraceae | LC | NKl 2, NKu 2 |
| *Gazania krebsiana subsp. krebsiana* | Asteraceae | LC | Gh 1 |
| *Gazania lichtensteinii* | Asteraceae | LC | NKl 1 |
| *Gethyllis longistyla* | Amaryllidaceae | Rare, PNCO | NKu 2 |
| *Gomphocarpus filiformis* | Apocynaceae | LC | NKl 1 |
| *Grewia robusta* | Malvaceae | LC | NKl 2, AZi 6 |
| *Gymnosporia buxifolia* | Celastraceae | LC | AZi 6 |
| *Haemanthus humilis subsp. humilis* | Amaryllidaceae | LC, PNCO | Gh 1 |
| *Haworthia decipiens var. cyanea* | Asphodelaceae | Not Eval | NKl 2 |
| *Haworthia greenii* | Asphodelaceae | PNCO | NKl 2 |
| *Hebenstretia dentata* | Scrophulariaceae | LC | Gh 1 |
| *Helichrysum asperum var. albidulum* | Asteraceae | LC | Gh 1 |
| *Helichrysum dregeanum* | Asteraceae | LC | Gh 1 |
| *Helichrysum lucilioides* | Asteraceae | LC | NKl 1, Gh 1, NKu 2 |
| *Helichrysum niveum* | Asteraceae | LC | Gh 1 |
| *Helichrysum nudifolium var. nudifolium* | Asteraceae | LC | Gh 1 |
| *Helichrysum rosum* | Asteraceae | LC | Gh 1 |
| *Helichrysum scitulum* | Asteraceae | LC | Gh 1 |
| *Helichrysum sessile* | Asteraceae | LC | Gh 1 |
| *Helichrysum tysonii* | Asteraceae | LC | Gh 1 |
| *Helichrysum zeyheri* | Asteraceae | LC | NKl 2, Gh 1, NKu 2 |
| *Hereroa incurva* | Aizoaceae | LC, PNCO | NKl 1 |
| *Hereroa latipetala* | Aizoaceae | LC, PNCO | NKl 1 |
| *Hereroa odorata* | Aizoaceae | LC, PNCO | NKl 1 |
| *Hermannia cuneifolia* | Malvaceae | LC | NKl 2 |
| *Hermannia desertorum* | Malvaceae | LC | NKl 1 |
| *Hermannia filifolia var. filifolia* | Malvaceae | NE | NKu 2 |
| *Hermannia grandiflora* | Malvaceae | LC | NKl 1 |
| *Hermannia multiflora* | Malvaceae | LC | NKu 2 |
| *Hermannia pulchella* | Malvaceae | LC | NKu 2 |
| *Hermannia spinosa* | Malvaceae | LC | NKl 1 |
| *Hermannia vestita* | Malvaceae | LC | NKu 2 |
| *Heteropogon contortus* | Poaceae | LC | Gh 1, NKu 2 |
| *Hoodia dregei* | Apocynaceae | VU D2 | NKl 1 |
| *Indigofera sessilifolia* | Fabaceae | LC | NKl 2, Gh 1, NKu 2 |
| *Isolepis expallescens* | Cyperaceae | VU D2 | AZi 6 |
| *Jamesbrittenia atropurpurea* | Scrophulariaceae | LC | NKu 2 |
| *Jamesbrittenia tenuifolia* | Scrophulariaceae | LC | NKl 1 |
| *Karroochloa purpurea* | Poaceae | LC | Gh 1 |
| *Kleinia longiflora* | Asteraceae | LC | NKl 1, NKu 2 |
| *Kniphofia acraea* | Asphodelaceae | Rare, PNCO | Gh 1 |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| *Lachenalia aurioliae* | Hyacinthaceae | LC, PNCO | NKu 2 |
| *Lasiospermum bipinnatum* | Asteraceae | LC | Gh 1 |
| *Lepidium africanum subsp. africanum* | Brassicaceae | LC | NKl 1, NKl 2, Gh 1, NKu 2 |
| *Lepidium desertorum* | Brassicaceae | LC | NKl 1 |
| *Lessertia frutescens* | | LC | NKu 2 |
| *Lessertia pauciflora var. pauciflora* | Fabaceae | LC | NKl 1 |
| *Leysera tenella* | Asteraceae | LC | NKl 1, NKu 2 |
| *Limeum aethiopicum* | Molluginaceae | LC | NKl 1, NKl 2, Gh 1, NKu 2 |
| *Lithospermum diversifolium* | Boraginaceae | LC | Gh 1 |
| *Lotononis azureoides* | Fabaceae | Rare | NKu 2 |
| *Lycium cinereum* | Solanaceae | LC | NKl 1, NKl 2, AZi 6, NKu 2 |
| *Lycium hirsutum* | Solanaceae | LC | AZi 6 |
| *Lycium oxycarpum* | Solanaceae | LC | NKl 1, NKl 2, AZi 6, NKu 2 |
| *Lycium schizocalyx* | Solanaceae | LC | NKl 1, NKl 2 |
| *Malephora uitenhagensis* | Aizoaceae | LC, PNCO | AZi 6 |
| *Manulea karrooica* | Scrophulariaceae | LC | NKl 1 |
| *Melianthus comosus* | Melianthaceae | LC | AZi 6, NKu 2 |
| *Melica decumbens* | Poaceae | LC | Gh 1 |
| *Melolobium candicans* | Fabaceae | LC | NKl 1, NKu 2 |
| *Melolobium microphyllum* | Fabaceae | LC | NKu 2 |
| *Merxmuellera disticha* | Poaceae | LC | Gh 1, NKu 2 |
| *Mestoklema tuberosum* | Aizoaceae | LC, PNCO | NKl 2 |
| *Microloma armatum* | Apocynaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Monechma incanum* | Acanthaceae | LC | NKu 2 |
| *Monechma spartioides* | Acanthaceae | LC | NKl 1 |
| *Moraea polystachya* | Iridaceae | LC, PNCO | NKl 1, NKl 2 |
| *Nananthus vittatus* | Aizoaceae | PNCO, DDT (Data Deficient, Taxonomically Problematic) | Not endemic to South Africa. Free State, Northern Cape, North-West provinces. Found on the edges of alluvial areas. Confirmed present in the area, but not within the Tango site. |
| *Nemesia fruticans* | Scrophulariaceae | LC | Gh 1 |
| *Nenax microphylla* | Rubiaceae | LC | NKu 2 |
| *Ornithogalum paucifolium subsp. karooparkense* | Hyacinthaceae | PNCO | NKu 2 |
| *Oropetium capense* | Poaceae | LC | NKl 1 |
| *Osteospermum microphyllum* | Asteraceae | LC | NKl 1 |
| *Oxalis depressa* | Oxalidaceae | LC | Gh 1, NKu 2 |
| *Pachypodium succulentum* | Apocynaceae | LC | NKl 2, NKu 2 |
| *Panicum stapfianum* | Poaceae | LC | Gh 1 |
| *Passerina montana* | Thymelaeaceae | LC | Gh 1 |
| *Peersia frithii* | Aizoaceae | NEST (M), Vulnerable | A species previously collected widely throughout the southern of the Karoo with an historic extent of occurrence (EOO) of 28913 km². It has only been recorded seven times |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| | | | since 1990 and is suspected to be extant at 6 locations from a current EOO of 690 km². Decline is suspected to be the result of livestock overgrazing and trampling. No historical records near the site but it does fall within east-west distribution range. Possibly present, Not recorded. |
| *Pegolettia retrofracta* | Asteraceae | LC | NKl 2, NKu 2 |
| *Pelargonium abrotanifolium* | Geraniaceae | LC | NKu 2 |
| *Pelargonium minimum* | Geraniaceae | LC | NKu 2 |
| *Pelargonium ramosissimum* | Geraniaceae | LC | NKu 2 |
| *Pentaschistis cirrhulosa* | Poaceae | LC | Gh 1 |
| *Pentaschistis microphylla* | Poaceae | LC | Gh 1 |
| *Pentzia cooperi* | Asteraceae | LC | Gh 1 |
| *Pentzia globosa* | Asteraceae | LC | NKu 2 |
| *Pentzia incana* | Asteraceae | LC | NKl 1, NKl 2, AZi 6 |
| *Pentzia pinnatisecta* | Asteraceae | LC | NKl 1 |
| *Pentzia spinescens* | Asteraceae | LC | NKu 2 |
| *Phragmites australis* | Poaceae | LC | AZi 6 |
| *Phymaspermum parvifolium* | Asteraceae | LC | NKl 2 |
| *Piaranthus comptus* | Apocynaceae | LC | NKl 1, NKl 1 |
| *Pleiospilos compactus* | Aizoaceae | LC, PNCO | NKl 1 |
| *Plinthus karooicus* | Aizoaceae | LC, PNCO | NKl 1, NKl 2, NKu 2 |
| *Polygala seminuda* | Polygalaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Psilocaulon articulatum* | Aizoaceae | LC, PNCO | NKl 2 |
| *Psilocaulon coriarium* | Aizoaceae | LC, PNCO | NKl 2 |
| *Pteronia adenocarpa* | Asteraceae | LC | NKl 1, NKl 2, NKu 2 |
| *Pteronia glauca* | Asteraceae | LC | NKl 1, NKl 2, NKu 2 |
| *Pteronia sordida* | Asteraceae | LC | NKl 1, NKl 2, NKu 2 |
| *Pteronia viscosa* | Asteraceae | LC | NKl 1 |
| *Rhigozum obovatum* | Bignoniaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Rhinephyllum luteum* | Aizoaceae | LC, PNCO | NKl 1 |
| *Rhombophyllum nelii* | Aizoaceae | LC, PNCO | NKl 2 |
| *Rhus burchellii* | Anacardiaceae | LC | NKl 1, NKu 2 |
| *Rhus lancea* | Anacardiaceae | LC | AZi 6 |
| *Rhus lucida* | Anacardiaceae | LC | Gh 1 |
| *Rosenia humilis* | Asteraceae | LC | NKl 1, NKl 2, NKu 2 |
| *Rumex lanceolatus* | Polygonaceae | LC | Gh 1 |
| *Ruschia beaufortensis* | Aizoaceae | VU D2, PNCO | NKl 1 |
| *Ruschia cradockensis subsp. cradockensis* | Aizoaceae | LC, PNCO | NKl 2 |
| *Ruschia intricata* | Aizoaceae | LC, PNCO | NKl 1 |
| *Ruschia spinosa* | Aizoaceae | LC, PNCO | NKl 1 |
| *Ruschia vanderbergiae* | Aizoaceae | LC, PNCO | NKl 2 |
| *Salsola aphylla* | Chenopodiaceae | LC | AZi 6 |
| *Salsola arborea* | Chenopodiaceae | Not Eval | AZi 6 |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| *Salsola geminiflora* | Chenopodiaceae | LC | AZi 6 |
| *Salsola gemmifera* | Chenopodiaceae | Not Eval | AZi 6 |
| *Salsola tuberculata* | Chenopodiaceae | DDT | NKl 1 |
| *Sarcocaulon camdeboense* | Geraniaceae | LC | NKl 2 |
| *Sarcocaulon patersonii* | Geraniaceae | LC | NKl 1, NKl 2 |
| *Sceletium expansum* | Aizoaceae | VU B1ab (ii,iii,iv,v) | NKu 2 |
| *Schoenoxiphium rufum var. dregeanum* | Cyperaceae | LC | Gh 1 |
| *Selago albida* | Scrophulariaceae | LC | Gh 1, NKu 2 |
| *Selago bolusii* | Scrophulariaceae | LC | Gh 1 |
| *Selago fruticosa* | Scrophulariaceae | LC | NKl 2 |
| *Selago geniculata* | Scrophulariaceae | LC | NKl 1 |
| *Selago magnakarooica* | Scrophulariaceae | LC | NKu 2 |
| *Selago saxatilis* | Scrophulariaceae | LC | Gh 1 |
| *Senecio acutifolius* | Asteraceae | LC | NKl 2 |
| *Senecio asperulus* | Asteraceae | LC | Gh 1 |
| *Senecio burchellii* | Asteraceae | LC | Gh 1 |
| *Senecio radicans* | Asteraceae | DDT | NKl 2 |
| Sensitive Species 1039 | | NEST (M), Vulnerable | This taxon has a restricted distribution range, with an extent of occurrence (EOO) of 5 594 km². It is known from eight locations and is declining for unknown reasons. This taxon occurs in the southern Great Karoo from Aberdeen and Graaff-Reinet southwards to Rietbron and eastwards to Willowmore, Klipplaat and Steytlerville. Possibly present, Not recorded. |
| Sensitive species 1212 | | NEST (M), Vulnerable | EOO <7 000 km², known from fewer than 10 locations and habitat quality and number of mature individuals are declining as a result of livestock (sheep and goat) overgrazing and illegal collection for the succulent plant trade. Potentially threatened at some locations by prospecting for uranium mining. Willowmore to Beaufort West and Aberdeen. Possibly present, Not recorded. |
| *Sericocoma avolans* | Amaranthaceae | LC | NKl 1 |
| *Sesamum capense* | Pedaliaceae | LC | NKl 1 |
| *Sisyndite spartea* | Zygophyllaceae | LC | NKl 1 |
| *Solanum capense* | Solanaceae | LC | NKu 2 |
| *Sporobolus fimbriatus* | Poaceae | LC | NKu 2 |
| *Stapelia engleriana* | Apocynaceae | DDT | NKl 1 |
| *Stipagrostis ciliata* | Poaceae | LC | NKl 1, NKu 2 |
| *Stipagrostis namaquensis* | Poaceae | LC | AZi 6 |
| *Stipagrostis obtusa* | Poaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Stomatium suaveolens* | Aizoaceae | LC, PNCO | NKu 2 |
| *Sutera halimifolia* | Scrophulariaceae | | NKl 2, NKu 2 |

| SCIENTIFIC NAME | FAMILY | STATUS[14] | COMMENT/PRESENCE[15] |
|---|---|---|---|
| *Sutera pinnatifida* | Scrophulariaceae | LC | Gh 1, NKu 2 |
| *Syringodea pulchella* | Iridaceae | VU D2, PNCO | Gh 1 |
| *Tamarix usneoides* | Tamaricaceae | LC | AZi 6 |
| *Tetrachne dregei* | Poaceae | LC | Gh 1 |
| *Tetragonia arbuscula* | Aizoaceae | LC, PNCO | NKu 2 |
| *Tetragonia microptera* | Aizoaceae | LC, PNCO | NKl 1 |
| *Themeda triandra* | Poaceae | LC | Gh 1, NKu 2 |
| *Thesium hystrix* | Santalaceae | LC | NKl 2 |
| *Thesium lineatum* | Santalaceae | LC | NKl 1, NKu 2 |
| *Tragus berteronianus* | Poaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Tragus diffusa* | Poaceae | | NKl 2 |
| *Tragus koelerioides* | Poaceae | LC | NKl 1, NKl 2, Gh 1, NKu 2 |
| *Tragus racemosus* | Poaceae | LC | NKl 2 |
| *Tribulus terrestris* | Zygophyllaceae | LC | NKl 1, NKl 2, NKu 2 |
| *Trichodiadema barbatum* | Aizoaceae | LC, PNCO | NKl 1, NKl 2, NKu 2 |
| *Tridentea parvipuncta subsp. parvipuncta* | Apocynaceae | LC | NKl 1 |
| *Tridentea virescens* | Apocynaceae | NEST (M), Rare | A widespread species that occurs as sporadic small subpopulations of up to six plants. No threats are known to impact this species. Warmbad in southern Namibia to Kakamas and Prieska in the Northern Cape stretching east to Prince Albert and Aberdeen. Possibly present, Not recorded. |
| *Tripteris aghillana var. integrifolia* | Asteraceae | NE | Gh 1 |
| *Tripteris sinuata var. linearis* | Asteraceae | LC | NKl 1 |
| *Tritonia tugwelliae* | Iridaceae | LC, PNCO | NKl 1 |
| *Troglophyton capillaceum subsp. capillaceum* | Asteraceae | LC | NKu 2 |
| *Ursinia nana* | Asteraceae | LC | NKl 1 |
| *Vellereophyton niveum* | Asteraceae | LC | NKu 2 |
| *Wahlenbergia albens* | Campanulaceae | LC | Gh 1 |
| *Wahlenbergia sphaerica* | Campanulaceae | DDT | Gh 1 |
| *Wahlenbergia tenella* | Campanulaceae | LC | NKu 2 |
| *Zygophyllum flexuosum* | Zygophyllaceae | LC | NKu 2 |
| *Zygophyllum microcarpum* | Zygophyllaceae | LC | NKl 1 |
| *Zygophyllum microphyllum* | Zygophyllaceae | LC | NKl 1, NKl 2 |

### 7.3.2 Fauna

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

| SCIENTIFIC NAME | COMMON NAME | STATUS[16] | COMMENT/PRESENCE |
|---|---|---|---|
| **MAMMALS** | | | |
| *Aethomys namaquensis* | Namaqua Rock Mouse | LC | |
| *Antidorcas marsupialis* | Springbok | LC (2016) | |
| *Canis mesomelas* | Black-backed Jackal | LC (2016) | |
| *Caracal caracal* | Caracal | LC (2016) | |
| *Chlorocebus pygerythrus* | Vervet Monkey | LC (2016) | |
| *Chlorocebus pygerythrus pygerythrus* | Vervet Monkey (subspecies pygerythrus) | LC (2008) | |
| *Cistugo lesueuri* | Lesueur's Wing-gland Bat | LC (2016) | |
| *Connochaetes gnou* | Black Wildebeest | LC (2016) | |
| *Crocidura cyanea* | Reddish-gray Musk Shrew | LC (2016) | |
| *Crocidura flavescens* | Greater Red Musk Shrew | LC (2016) | |
| *Cynictis penicillata* | Yellow Mongoose | LC (2016) | |
| ***Damaliscus pygargus pygargus*** | **Bontebok** | **Vulnerable (2016)** | |
| *Desmodillus auricularis* | Cape Short-tailed Gerbil | LC (2016) | |
| *Elephantulus edwardii* | Cape Elephant Shrew | LC (2016) | |
| *Elephantulus sp.* | Elephant Shrews | | |
| *Eptesicus (Eptesicus) hottentotus* | Long-tailed Serotine | LC | |
| *Felis nigripes* | Black-footed Cat | Vulnerable (2016) | |
| *Felis silvestris* | Wildcat | LC (2016) | |
| *Genetta genetta* | Common Genet | LC (2016) | |
| *Gerbilliscus paeba* | Paeba Hairy-footed Gerbil | LC (2016) | |
| *Herpestes ichneumon* | Egyptian Mongoose | LC (2016) | |
| *Herpestes pulverulentus* | Cape Gray Mongoose | LC (2016) | |
| ***Hippotragus niger niger*** | | **Vulnerable (2016)** | |
| *Hystrix africaeaustralis* | Cape Porcupine | LC | |
| *Ictonyx striatus* | Striped Polecat | LC (2016) | |
| ***Leptailurus serval*** | **Serval** | **Near Threatened (2016)** | |
| *Lepus capensis* | Cape Hare | LC | |
| *Lepus saxatilis* | Scrub Hare | LC | |
| *Macroscelides proboscideus* | Short-eared Elephant Shrew | LC (2016) | |
| *Macroscelides sp.* | Round-eared Sengi | | |
| *Malacothrix typica* | Large-eared African Desert Mouse | LC (2016) | |
| *Mellivora capensis* | Honey Badger | LC (2016) | |
| *Miniopterus natalensis* | Natal Long-fingered Bat | LC (2016) | |
| *Mus (Mus) musculus* | House Mouse | LC | |
| *Mus (Nannomys) minutoides* | Southern African Pygmy Mouse | LC | |
| *Myosorex varius* | Forest Shrew | LC (2016) | |

[16] IUCN - Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Least Concern (LC); End – Endemic; TNCO – Transvaal Provincial Nature Conservation Ordinance; Ex, Exotic/Invasive/Weed; NFA – National Forest Act; ToPS – Threatened or Protected Species, Not Threatened – Not an IUCN category.

| SCIENTIFIC NAME | COMMON NAME | STATUS[16] | COMMENT/PRESENCE |
|---|---|---|---|
| *Neoromicia capensis* | Cape Serotine | LC (2016) | |
| *Nycteris thebaica* | Egyptian Slit-faced Bat | LC (2016) | |
| *Oreotragus oreotragus* | Klipspringer | LC (2016) | |
| *Orycteropus afer* | Aardvark | LC (2016) | |
| *Oryx gazella* | Gemsbok | LC (2016) | |
| *Otocyon megalotis* | Bat-eared Fox | LC (2016) | |
| *Otomys sp.* | Vlei Rats | | |
| *Otomys unisulcatus* | Karoo Bush Rat | LC (2016) | |
| ***Panthera pardus*** | **Leopard** | **Vulnerable (2016)** | |
| *Papio ursinus* | Chacma Baboon | LC (IUCN, 2016) | |
| *Parotomys brantsii* | Brants's Whistling Rat | LC (2016) | |
| *Pedetes capensis* | South African Spring Hare | LC (2016) | |
| *Procavia capensis capensis* | Cape Rock Hyrax | LC (2015) | |
| *Pronolagus rupestris* | Smith's Red Rock Hare | LC (2016) | |
| *Pronolagus saundersiae* | Hewitt's Red Rock Rabbit | LC (2016) | |
| *Proteles cristata* | Aardwolf | LC (2016) | |
| *Raphicerus campestris* | Steenbok | LC (2016) | |
| *Redunca fulvorufula* | Mountain Reedbuck | LC | |
| *Rhabdomys pumilio* | Xeric Four-striped Grass Rat | LC (2016) | |
| *Rhinolophus clivosus* | Geoffroy's Horseshoe Bat | LC (2016) | |
| ***Rhinolophus hildebrandtii*** | **Hildebrandt's Horseshoe Bat** | **Near Threatened** | **Refer to Bat Assessment** |
| *Sauromys petrophilus* | Roberts's Flat-headed Bat | LC (2016) | |
| *Suricata suricatta* | Meerkat | LC (2016) | |
| *Sylvicapra grimmia* | Bush Duiker | LC (2016) | |
| *Tadarida aegyptiaca* | Egyptian Free-tailed Bat | LC (2016) | |
| *Tragelaphus strepsiceros* | Greater Kudu | LC (2016) | |
| *Vulpes chama* | Cape Fox | LC (2016) | |
| *Xerus inauris* | South African Ground Squirrel | LC | |
| **BIRDS**[17] | | | |
| *Refer to Avifaunal Assessment* | | | |
| **REPTILES** | | | |
| *Acontias meleagris* | Cape Legless Skink | LC (SARCA 2014) | |
| *Afroedura karroica* | Karoo Flat Gecko | LC (IUCN 2018) | |
| *Agama aculeata aculeata* | Common Ground Agama | LC (SARCA 2014) | |
| *Agama atra* | Southern Rock Agama | LC (SARCA 2014) | |
| *Bitis arietans arietans* | Puff Adder | LC (SARCA 2014) | |
| *Bradypodion ventrale* | Eastern Cape Dwarf Chameleon | LC (SARCA 2014) | |
| *Chersina angulata* | Angulate Tortoise | LC (SARCA 2014) | |
| ***Chersobius boulengeri*** | **Karoo Padloper** | **EN A4ace, NEST (M), PNCO** | **Habitat destruction and degradation nearly 50% of the range of C. boulengeri is** |

[17] BLSA – Birdlife South Africa

| SCIENTIFIC NAME | COMMON NAME | STATUS[16] | COMMENT/PRESENCE |
|---|---|---|---|
| | | | **either moderately or severely degraded, which may explain maps of South Africa (Hoffman et al. 1999) show that the species' decline. Chersobius boulengeri is associated with rocky outcrops in specific vegetation types, qualifying it as a habitat specialist, which increases its risk of extinction.** |
| *Chondrodactylus angulifer* | Giant Ground Gecko | LC (IUCN 2009) | |
| *Chondrodactylus bibronii* | Bibron's Gecko | LC (SARCA 2014) | |
| *Cordylus cordylus* | Cape Girdled Lizard | LC (SARCA 2014) | |
| *Dispholidus typus typus* | Boomslang | LC (SARCA 2014) | |
| *Homopus femoralis* | Greater Padloper | LC (SARCA 2014) | |
| *Homopus sp.* | | | |
| *Karusasaurus polyzonus* | Karoo Girdled Lizard | LC (SARCA 2014) | |
| *Lamprophis aurora* | Aurora House Snake | LC (SARCA 2014) | |
| *Naja nivea* | Cape Cobra | LC (SARCA 2014) | |
| *Nucras livida* | Karoo Sandveld Lizard | LC (SARCA 2014) | |
| *Pachydactylus capensis* | Cape Gecko | LC (SARCA 2014) | |
| *Pachydactylus latirostris* | Quartz Gecko | LC (SARCA 2014) | |
| *Pachydactylus maculatus* | Spotted Gecko | LC (SARCA 2014) | |
| *Pachydactylus mariquensis* | Marico Gecko | LC (SARCA 2014) | |
| *Pedioplanis burchelli* | Burchell's Sand Lizard | LC (SARCA 2014) | |
| *Pedioplanis laticeps* | Karoo Sand Lizard | LC (SARCA 2014) | |
| *Pedioplanis lineoocellata pulchella* | Common Sand Lizard | LC (SARCA 2014) | |
| *Pedioplanis namaquensis* | Namaqua Sand Lizard | LC (SARCA 2014) | |
| *Pelomedusa galeata* | South African Marsh Terrapin | Not evaluated | |
| *Psammobates tentorius subsp. ?* | Tent Tortoise (subsp. ?) | LC (SARCA 2014) | |
| *Psammobates tentorius tentorius* | Karoo Tent Tortoise | | |
| *Psammophis notostictus* | Karoo Sand Snake | LC (SARCA 2014) | |
| *Psammophylax rhombeatus* | Spotted Grass Snake | LC (SARCA 2014) | |
| *Pseudaspis cana* | Mole Snake | LC (SARCA 2014) | |
| *Pseudocordylus microlepidotus fasciatus* | Karoo Crag Lizard | LC (SARCA 2014) | |
| *Ptenopus garrulus maculatus* | Spotted Barking Gecko | LC (SARCA 2014) | |
| *Rhinotyphlops lalandei* | Delalande's Beaked Blind Snake | LC (SARCA 2014) | |
| *Stigmochelys pardalis* | Leopard Tortoise | LC (SARCA 2014) | |
| *Trachylepis capensis* | Cape Skink | LC (SARCA 2014) | |
| *Trachylepis homalocephala* | Red-sided Skink | LC (SARCA 2014) | |
| *Trachylepis occidentalis* | Western Three-striped Skink | LC (SARCA 2014) | |

| SCIENTIFIC NAME | COMMON NAME | STATUS[16] | COMMENT/PRESENCE |
|---|---|---|---|
| *Trachylepis sulcata* | Western Rock Skink | | |
| *Trachylepis sulcata sulcata* | Western Rock Skink | LC (SARCA 2014) | |
| *Trachylepis variegata* | Variegated Skink | LC (SARCA 2014) | |
| *Trachylepis variegata* | Variegated Skink (subsp. ?) | | |
| *Varanus albigularis albigularis* | Rock Monitor | LC (SARCA 2014) | |
| **AMPHIBIANS** | | | |
| *Amietia fuscigula* | Cape River Frog | LC (2017) | |
| *Amietia poyntoni* | Poynton's River Frog | LC (2017) | |
| *Cacosternum boettgeri* | Common Caco | LC (2013) | |
| *Cacosternum nanum* | Bronze Caco | LC (2013) | |
| *Kassina senegalensis* | Bubbling Kassina | LC | |
| *Poyntonophrynus vertebralis* | Southern Pygmy Toad | LC | |
| ***Pyxicephalus adspersus*** | **Giant Bull Frog** | **Near Threatened** | |
| *Sclerophrys capensis* | Raucous Toad | LC | |
| *Strongylopus grayii* | Clicking Stream Frog | LC | |
| *Tomopterna delalandii* | Cape Sand Frog | LC | |
| *Tomopterna tandyi* | Tandy's Sand Frog | LC | |
| *Vandijkophrynus gariepensis gariepensis* | Karoo Toad (subsp. gariepensis) | | |
| *Xenopus laevis* | Common Platanna | LC | |
| **INVERTEBRATES** | | | |
| ***SCORPIONS*** | | | |
| *Opistophthalmus carinatus* | | ToPS | |
| *Opistophthalmus crassimanus* | | ToPS | |
| *Opistophthalmus karrooensis* | | ToPS | |
| *Opistophthalmus pictus* | | ToPS | |
| *Parabuthus capensis* | | ToPS | |
| *Parabuthus schlechteri* | | ToPS | |
| *Uroplectes carinatus* | | ToPS | |
| ***SPIDERS*** | | | |
| *Argiope australis* | Common garden orb-web spiders | | |
| *Argiope sp.* | Garden orb-web spiders | | |
| *Caerostris sp.* | Bark spiders | | |
| *Cyclosa sp.* | Garbage-line web spiders | | |
| *Harpactira namaquensis* | | ToPS | |
| *Harpactirella sp.* | | | |
| *Latrodectus geometricus* | Common brown button spiders | | |
| *Leucauge sp.* | Silvr vlei or silver swamp spiders | | |
| *Mexcala rufa* | Scaly mexcala ant-like jumping spiders | | |
| *Nephila senegalensis* | Banded-legged golden orb-web spider | | |

| SCIENTIFIC NAME | COMMON NAME | STATUS[16] | COMMENT/PRESENCE |
|---|---|---|---|
| *Oxyopes sp.* | Grass lynx spiders | | |
| *Palystes sp.* | Rain spiders | | |
| *Synema imitator* | Tree African mask crab spiders | | |
| **BUTTERFLIES** | | | |
| *Acanthovalva focularia* | | Not Threatened | |
| *Acanthovalva inconspicuaria* | | Not Threatened | |
| *Acraea horta* | Garden acraea | LC (SABCA 2013) | |
| *Aeropetes tulbaghia* | Table mountain beauty | LC (SABCA 2013) | |
| *Aloeides damarensis damarensis* | Damara russet | LC (SABCA 2013) | |
| *Aloeides depicta* | Depicta russet | LC (SABCA 2013) | |
| *Aloeides pierus* | Veined russet | LC (SABCA 2013) | |
| *Aloeides trimeni trimeni* | Brown russet | LC (SABCA 2013) | |
| *Anthene amarah amarah* | Black-striped ciliate blue | LC (SABCA 2013) | |
| *Anthene definita definita* | Steel-blue-ciliate blue | LC (SABCA 2013) | |
| *Anthene dulcis dulcis* | Mashuna ciliate blue | LC (SABCA 2013) | |
| *Argyraspodes argyraspis* | Warrior silver-spotted copper | LC (SABCA 2013) | |
| *Azanus jesous* | Topaz babul blue | LC (SABCA 2013) | |
| *Azanus moriqua* | Black-bordered babul blue | LC (SABCA 2013) | |
| *Azanus ubaldus* | Velvet-spotted babul blue | LC (SABCA 2013) | |
| *Belenois aurota* | Pioneer caper white | LC (SABCA 2013) | |
| *Belenois creona severina* | African caper white | LC (SABCA 2013) | |
| *Brephidium metophis* | Tinktinkie pygmy blue | LC (SABCA 2013) | |
| *Cacyreus marshalli* | Common geranium bronze | LC (SABCA 2013) | |
| *Cassionympha camdeboo* | Camdeboo dull brown | LC (SABCA 2013) | |
| *Catopsilia florella* | African migrant | LC (SABCA 2013) | |
| *Chiasmia inaequilinea* | | | |
| *Chilades trochylus* | Grass jewel blue | LC (SABCA 2013) | |
| *Chlorerythra rubriplaga* | | Not Threatened | |
| *Chrysoritis beaufortia beaufortia* | Beaufort opal | LC (SABCA 2013) | |
| *Chrysoritis chrysaor* | Burnished opal | LC (SABCA 2013) | |
| *Chrysoritis plutus* | Plutus opal | LC (SABCA 2013) | |
| *Cigaritis phanes* | Silvery silverline | LC (SABCA 2013) | |
| *Colias electo electo* | African clouded yellow | LC (SABCA 2013) | |
| *Colotis euippe omphale* | Southern round-winged orange tip | LC (LC) | |
| *Crudaria leroma* | Silver-spotted grey | LC (SABCA 2013) | |
| *Danaus chrysippus orientis* | African plain tiger | LC (SABCA 2013) | |
| *Deudorix antalus* | Brown playboy | LC (SABCA 2013) | |
| *Dira clytus eurina* | Cape autumn widow | LC (SABCA 2013) | |
| *Durbaniella clarki clarki* | Little rocksitter | LC (SABCA 2013) | |
| *Eicochrysops messapus messapus* | Cupreous ash blue | LC (SABCA 2013) | |

| SCIENTIFIC NAME | COMMON NAME | STATUS[16] | COMMENT/PRESENCE |
|---|---|---|---|
| *Gomalia elma elma* | Green-marbled skipper | LC (SABCA 2013) | |
| *Grammodes stolida* | | | |
| *Hypolimnas misippus* | Common diadem | LC (SABCA 2013) | |
| *Junonia hierta cebrene* | Yellow pansy | LC (SABCA 2013) | |
| *Kedestes barberae bonsa* | Freckled ranger | LC (SABCA 2013) | |
| *Lampides boeticus* | Pea blue | LC (SABCA 2013) | |
| *Lepidochrysops ortygia* | Koppie giant cupid | LC (SABCA 2013) | |
| *Leptomyrina lara* | Cape black-eye | LC (SABCA 2013) | |
| *Leptotes pirithous pirithous* | Common zebra blue | LC (SABCA 2013) | |
| *Loxostege frustalis* | | | |
| *Lycaena clarki* | Eastern sorrel copper | LC (SABCA 2013) | |
| *Mylothris agathina agathina* | Eastern dotted border | LC (SABCA 2013) | |
| *Oraidium barberae* | Dwarf blue | LC (SABCA 2013) | |
| *Papilio demodocus demodocus* | Citrus swallowtail | LC (SABCA 2013) | |
| *Pinacopteryx eriphia eriphia* | Zebra white | LC (SABCA 2013) | |
| *Pontia helice helice* | Southern meadow white | LC (SABCA 2013) | |
| *Pseudonympha magoides* | False silver-bottom brown | LC (SABCA 2013) | |
| *Rhabdosia vaninia* | | | |
| *Spialia agylla agylla* | Grassveld sandman | LC (SABCA 2013) | |
| *Spialia ferax* | Striped sandman | LC (SABCA 2013) | |
| *Spialia nanus* | Dwarf sandman | LC (SABCA 2013) | |
| *Stugeta bowkeri bowkeri* | Bowker's marbled sapphire | LC (SABCA 2013) | |
| *Stygionympha robertsoni* | Koppie hillside brown | LC (SABCA 2013) | |
| *Tarsocera fulvina* | Karoo spring widow | LC (SABCA 2013) | |
| *Thestor camdeboo* | Camdeboo skolly | LC (SABCA 2013) | |
| *Torynesis magna* | Large veined widow | LC (SABCA 2013) | |
| *Trimenia macmasteri macmasteri* | Karoo silver-spotted copper | LC (SABCA 2013) | |
| *Tylopaedia sardonyx sardonyx* | King copper | LC (SABCA 2013) | |
| *Vanessa cardui* | Painted lady | LC (SABCA 2013) | |
| *Ypthima asterope hereroica* | African three-ring | LC (SABCA 2013) | |
| *Zizeeria knysna knysna* | African grass blue | LC (SABCA 2013) | |

# 7.4 Appendix D: Systematic Conservation Planning

## 7.4.1 Vegetation of Southern Africa

### *Eastern Lower Karoo (NKl 2)*

VT 30 Central Lower Karoo (43%), VT 26 Karroid Broken Veld (31%) (Acocks 1953). LR 54 Central Lower Nama Karoo (94%) (Low & Rebelo 1996). Grassy Dwarf Shrublands of the Camdebo and Aberdeen plains, Dwarf Shrublands (typicum) of the Camdebo & Succulent Dwarf Shrubland (Palmer 1991a).

**Distribution** Eastern Cape and Western Cape Provinces: Plains east of the Kariega and Buffels Rivers in the area south of the Camdebo Mountains and the line of mountains linking to the Coetzeesberge encompassing Aberdeen, Graaff-Reinet and Pearston (region called Camdebo) and plains south of Aberdeen to Klipplaat and Miller. Contains some higher elevation islands of Camdebo Escarpment Thicket, Groot Thicket and Lower Karoo Gwarrieveld. Altitude varies mostly from 500–1 100 m.

**Vegetation & Landscape Features** Plains interrupted by some dolerite dykes, butts and mesas. The dominating vegetation is low to middle-height microphyllous shrubland with drought-resistant 'white' grasses becoming abundant in places, especially on sandy and silty bottomlands. Leaf-succulent dwarf shrubs of the families Aizoaceae and Crassulaceae can also be encountered.

**Geology & Soils** Flat or gently sloping pediments composed of mudstone and resistant sandstones of the Beaufort Group (Adelaide Subgroup), Ecca sediments and Dwyka tillites in the south, with some Jurassic dolerite intrusions in the north. About half the area has red-yellow, apedal, freely drained soils, <300 mm deep, with a high base status (Ag land type). Also, shallow Glenrosa and/or Mispah soils (Fc land type).

**Climate** Rainfall is mostly in late summer and early autumn, with main peak in March. MAP ranges from about 150 mm in the west to 350 mm in the east. Mean maximum and minimum monthly temperatures for Graaff-Reinet are 38.6 °C and –0.3 °C for January and July, respectively.

**Important Taxa** Small Trees: *Acacia karroo*. Tall Shrubs: *Lycium cinereum* (d), *L. oxycarpum* (d), *Cadaba aphylla*, *Carissa haematocarpa*, *Grewia robusta*, *Lycium schizocalyx*, *Rhigozum obovatum*. Low Shrubs: *Eriocephalus ericoides* subsp. *ericoides* (d), *Felicia muricata* (d), *Pentzia incana* (d), *Rosenia humilis* (d), *Aptosimum elongatum*, *Asparagus striatus*, *A. suaveolens*, *Barleria pungens*, *Blepharis capensis*, *B. mitrata*, *Chrysocoma ciliata*, *Euryops anthemoides*, *Felicia muricata*, *Galenia secunda*, *Garuleum latifolium*, *Helichrysum zeyheri*, *Hermannia cuneifolia*, *Indigofera sessilifolia*, *Limeum aethiopicum*, *Microloma armatum*, *Pegolettia retrofracta*, *Phymaspermum parvifolium*, *Plinthus karooicus*, *Polygala seminuda*, *Pteronia adenocarpa*, *P. glauca*, *P. sordida*, *Selago fruticosa*, *Senecio acutifolius*, *Sutera halimifolia*, *Zygophyllum microphyllum*. Succulent Shrubs: *Ruschia cradockensis* subsp. *cradockensis* (d), *Astroloba foliolosa*, *Crassula corallina*, *Drosanthemum lique*, *D. subspinosum*, *Euphorbia ferox*, *Mestoklema tuberosum*, *Pachypodium succulentum*, *Rhombophyllum nelii*, *Sarcocaulon camdeboense*, *S. patersonii*, *Trichodiadema barbatum*. Semiparasitic Shrub: *Thesium hystrix*, Graminoids: *Aristida adscensionis* (d), *A. congesta* (d), *Eragrostis lehmanniana* (d), *E. obtusa* (d), *Tragus berteronianus* (d), *T. koelerioides* (d), *T. racemosus* (d), *A. diffusa*, *Chloris virgata*, *Cynodon incompletus*, *Enneapogon desvauxii*, *Eragrostis curvula*, *Stipagrostis obtusa*. Herbs: *Chamaesyce inaequilatera*, *Convolvulus sagittatus*, *Gazania krebsiana*, *Lepidium africanum* subsp. *africanum*, *Tribulus terrestris*. Succulent Herbs: *Crassula muscosa*, *Psilocaulon articulatum*, *P. coriarium*, *Senecio radicans*. Geophytic Herbs: *Albuca setosa*, *Drimia anomala*, *D. intricata*, *Moraea polystachya*.

**Endemic Taxa** Succulent Shrubs: *Aloinopsis rubrolineata*, *Chasmatophyllum nelii*, *Cylindrophyllum calamiforme*, *Euphorbia coerulans*, *Ruschia vanderbergiae*. Succulent Herbs: *Haworthia decipiens* var. *cyanea*, *H. greenii*.

**Conservation** Least threatened. Target 16%. Some of patches statutorily conserved in Aberdeen and Karoo Nature Reserves as well as in private reserves such as Minnawill Game Farm. Between 1% and 2% transformed by alien infestation. Erosion is high (45%) and moderate (45%).

**Remarks** Vegetation structure of the Eastern Lower Karoo differs from the Gamka Karoo with its higher proportion of succulent dwarf shrubs (species of *Ruschia*) and higher frequency of larger woody shrubs (*Diospyros, Euclea, Lycium, Rhus*) associated with rocky outcrops and other mesic patches.

**References** Acocks (1953, 1988), Palmer (1988, 1989, 1991a, c), Hoffman (1989a, b), Du Toit (1996).

## *Southern Karoo Riviere AZi 6*

Including Mesic Riparian Bush & Xeric Riparian Bush (Van der Walt 1980). Riparian Thicket (Palmer 1991). Lycium cinereum-Salsola aphylla Shrubland & Acacia karroo-Stipagrostis namaquensis Riparian Woodland (Rubin & Palmer 1996). Becium burchellianum-Acacia karroo Woodland (Brown & Bezuidenhout 2000).

**Distribution** Western and Eastern Cape Provinces: Alluvia of the Buffels, Bloed, Dwyka, Gamka, Sout, Kariega, and Sundays Rivers and their tributaries), east of Laingsburg as far west as Graaff-Reinet and Jansenville. This vegetation unit is embedded within the Koedoesberge-Moordenaars Karoo, Prince Albert Succulent Karoo, Gamka Karoo, Eastern Lower Karoo, and southern parts of the Eastern Upper Karoo as well as some parts of the Albany Thicket Biome south of Cradock. Altitude ranging from 250–1 550 m.

**Vegetation & Landscape Features** Narrow riverine flats supporting a complex of *Acacia karroo* or *Tamarix usneoides* thickets (up to 5 m tall) and fringed by tall Salsola-dominated shrubland (up to 1.5 m high), especially on heavier (and salt-laden) soils on very broad alluvia. In sandy drainage lines *Stipagrostis namaquensis* may occasionally also dominate. Mesic thicket forms in the far eastern part of this region (see Van der Walt 1980: Table 4) may also contain *Leucosidea sericea*, *Rhamnus prinoides* and *Ehrharta erecta*.

**Geology, Soil & Hydrology** Recent sandy-clayey alluvial deposits rich in salt occurring on mudrocks and sandstones of the Adelaide Subgroup (Beaufort Group of the Karoo Supergroup) that support soils typical of Ia land type. Torrential convectional rains in summer cause sudden flood surges which remodel the riverbed and adjacent alluvium.

**Climate** Transitional, bimodal (equinoctial) rainfall patterns with peaks in March (major) and November (minor). Climate is subarid on the whole, with overall MAP of 243 mm (range from 165 mm in the Gamka Karoo basin to 430 mm in the vicinity of Bedford). Overall warm-temperate regime, with MAT of 16.3 °C, ranging from 14.6 °C (Upper Karoo) to 18.3 °C (upper reaches of Sundays River). Frost occurs frequently in winter.

**Important Taxa:** *Riparian thickets:* Small Trees: *Acacia karroo* (d), *Rhus lancea* (d). Tall Shrubs: *Diospyros lycioides* (d), *Tamarix usneoides* (d), *Cadaba aphylla, Euclea undulata, Grewia robusta, Gymnosporia buxifolia, Melianthus comosus*. Low Shrub: *Asparagus striatus*. Succulent Shrubs: *Lycium cinereum* (d), *Amphiglossa callunoides*, *Lycium hirsutum*, *L. oxycarpum*. *Rocky slopes of river canals:* Graminoid: *Stipagrostis namaquensis* (d). *Alluvial shrublands & herblands:* Low Shrubs: *Ballota africana*, *Bassia salsoloides, Carissa haematocarpa, Pentzia incana*. Succulent Shrubs: *Malephora uitenhagensis* (d), *Salsola aphylla* (d), *S. arborea* (d), *Drosanthemum lique*, *Salsola geminiflora*, *S. gemmifera*. Graminoids: *Cynodon incompletus* (d), *Cenchrus ciliaris*, *Cyperus marginatus*. *Reed beds:* Megagraminoid: *Phragmites australis* (d).

**Endemic Taxon:** *Alluvial shrublands & herblands:* Graminoid: *Isolepis expallescens*.

**Conservation** Least threatened. Target 24%. Only about 1.5% statutorily conserved in the Karoo National Park as well as in the Aberdeen, Bosberg, Commando Drift, Gamkapoort and Karoo Nature Reserves and in about 10 private reserves, mainly set up for game farming. Some 12% transformed for cultivation and building of dams, including Beaufort West, Beervlei, De Hoop, Floriskraal, Kommandodrift, Lake Arthur, Leeu-Gamka, Mentz and Vanryneveldspas Dams. Frequent disturbance (floods, concentrated grazing pressure), and associated input of nutrients, increase vulnerability of these habitats to invasion of alien woody species such as Agave americana, Opuntia species, Prosopis species, Salix babylonica and Schinus

molle, and forbs including *Atriplex eardleyae*, *A. lindleyi* subsp. *inflata*, *Cirsium vulgare*, *Salsola kali* and *Schkuhria pinnata*.

**Remark 1:** Due to the lingering taxonomic problems, the identity of South African species of Salsola sect. Caroxylon cited in various papers (see below), should be approached with caution.
**Remark 2:** Plants of drainage lines may be resistant to damage by hail storms. At the Tierberg Karoo Research site, 36 of the 44 species in drainage lines were undamaged after a hail storm, with the remaining species only slightly damaged (Milton & Collins 1989). This contrasted with much higher levels of damage to plants of the surrounding habitats (flats and heuweltjies).
References Acocks (1979), Van der Walt (1980), Palmer (1988, 1989, 1991), Milton (1990), Rubin & Palmer (1996), Brown & Bezuidenhout (2000).

### 7.4.2 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019)

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was undertaken in this assessment. Some of the many good reasons for this include: an updated land cover map, changes to Provincial borders, a large body of environmental and biodiversity data that has been generated over the past 10 years; and the development of approximately 29 other environmental and biodiversity plans for parts of the province that require integration. In addition, significant strides have been made with respect to defining and mapping biodiversity pattern and biodiversity processes, which have been standardised to ensure a level of consistency throughout the country (SANBI, 2017). The ECBCP (2019) will replace the ECBCP (2007) in its entirety.

*The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, "Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans".*

*The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in* Table 2.

*Table 10: Linking CBA categories to management objectives.*

| CBA Map Category | Desired State | Land management objective |
|---|---|---|
| Protected Areas | Natural | Protected Areas are managed through Protected Area Management Plans and are therefore not managed through the ECBCP (2019). |
| Critical Biodiversity Area 1 | Natural | Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:<br>For areas classified as CBA 1, the following objectives must apply:<br>• Ecosystem and species must remain intact and undisturbed.<br>• Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met.<br>• Important: these biodiversity features are at, or beyond, their limits of acceptable change.<br>If land use activities are unavoidable in these areas and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented. |
| Critical Biodiversity Area 2 | Natural | Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:<br>For areas classified as CBA 2, the following objectives must apply: |

| CBA Map Category | Desired State | Land management objective |
|---|---|---|
| | | • Ecosystem and species must remain intact and undisturbed.<br>There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA 2 area may elevate other CBA 2 areas to a CBA 1 category.<br>• These biodiversity features are at risk of reaching their limits of acceptable change.<br>If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented. |
| Ecological Support Area 1 | Functional | Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.<br>For areas classified as ESA 1, the following objectives apply:<br>• These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.<br>• These systems may vary in condition and maintaining function is the main objective, therefore:<br>o Ecosystems still in natural, near natural state should be maintained.<br>o Ecosystems that are moderately disturbed/degraded should be restored. |
| Ecological Support Area 2 | Functional | Maintain current land use with no intensification.<br>For areas classified as ESA 2, the following objectives apply:<br>• These areas have already been subjected to severe and/or irreversible modification<br>• These areas are not required to meet biodiversity targets, but they may still perform *some* function with respect to connectivity, ecosystem service delivery and climate change resilience<br>• Objective is to maintain remaining function, therefore:<br>o Areas should not undergo any further deterioration in ecological function.<br>o Opportunities to change land use practices to improve ecological function (i.e., cultivation agriculture to livestock grazing agriculture) are desirable in ESA 2 areas. |
| Other Natural Areas and No Natural Habitat Remaining | Production | No desired state or management objective is provided for ONA or NNR. |

### *Description of land use types and activities*

A range of various land use types and activities associated with the Eastern Cape are described below. These have been derived from SPLUMA land use categories, municipal zoning scheme definitions and predominant land uses, and practices present in the Eastern Cape. Each category has been expressly linked to corresponding SPLUMA land use category for the purposes of facilitating the integration of

the CBA map land use guidelines into other spatial planning products such as Spatial Development Frameworks. These land uses are described in more detail in *Table 11* below.

*Table 11: Description of Land Use Types and Activities.*

| |
|---|
| **Environmental Conservation** |
| Environmental Conservation is where land uses are primarily involved with conservation activities. These include:<br>• Conservation management activities in formal protected areas and informal conservation areas managed for biodiversity (wildlife conservation and recreational/educational tourism).<br>• Low-intensity eco-tourism activities (such as hiking trails).<br>Subject to appropriate controls, planning and management, these land use activities can be accommodated in CBAs and ESAs. It is the preferred land use in CBAs and ESAs.<br>This land use zone corresponds to the SPLUMA scheduled land use purpose 'conservation'. This land use activity provides for the following:<br>• Protection of the natural environment and natural processes for their cultural, historic, scientific, scenic, biodiversity, habitat or economic.<br>Sustainable delivery of ecosystem services to the community. |
| **Tourism** |
| The Tourism and Accommodation land use covers broad range of tourist and recreational facility types, inclusive of tourism, recreation and accommodation facilities. Tourism and Accommodation is divided into two sub-categories depending on the level of intensity of development and types of activities involved:<br><br><u>Low impact tourism, recreation and accommodation</u><br>This includes low impact facilities that include camp sites and "rondavels" or traditional homestead structures, hiking trails, ablutions, gift/coffee shops, cultural centres. Sustainable rural tourism, rural businesses and communities that provide for the rural recreational and leisure needs of urban and rural dwellers, could be allowed in CBAs and ESAs provided that the development is in keeping with the management objective of the CBA or ESA and is subject to the appropriate biodiversity-related controls being in place.<br><br>The SPLUMA land use purpose for this activity would be 'Residential' but would have an equivalent classification in a municipal zoning scheme of 'Low density Special/Resort Zone'. |
| **High-impact tourism facilities** |
| This includes developments such as lodges, hotels, large resorts, golf courses and estates.<br>High-impact tourism and accommodation facilities should only be considered in ESA 2 or ONA's. In all cases, the current state of ESA 2 areas must be maintained (e.g., pineapple field converted to golf-course would maintain connectivity in the landscape). The location of infrastructure must be placed outside of natural areas (CBAs and ESAs), must be clustered and be located adjacent to existing urban development.<br><br>The SPLUMA land use purpose for this activity would be 'Residential' but would have an equivalent classification in a municipal zoning scheme of 'Special/Resort Zone'. |
| **Municipal commonage** |
| The municipal commonage areas provide for the implementation of the Municipal Commonage Policy of the National Government and the relevant municipality, and to promote and facilitate local agri-economic development. This land use corresponds to the SPLUMA scheduled land use purpose 'agriculture" and is often used for extensive unmanaged grazing, which is not compatible with land management objectives of CBAs but may (under management) be permitted in ESAs.<br><br>Commonage is typically covered by natural vegetation. These areas therefore have the potential to contribute towards biodiversity conservation if managed appropriately and may be instrumental for retaining ecological connectivity across landscapes. |
| **Rural residential** |
| The rural residential land use type includes a range of residential and recreational activities. It is divided into two sub-types described below.<br>The SPLUMA land use purpose would be 'Residential' but may be associated with a municipal zoning scheme equivalent of 'low density/special/resort'.<br><br><u>Low density rural housing and eco-estates</u><br>This land use type is associated with low density residential and eco-estate development. Low density is defined here as covering 0.2% (please see text box below for clarification) or less of a property. It makes provision for rural housing development such as low-density, lifestyle estates, multi-ownership of reserves, eco-estates (but excluding golf estates). Land uses in this zone can be compatible in CBAs and ESAs, although impacts should be carefully assessed and managed.<br>NOTE: It is important to clarify how the 0.2% was derived. Several zoning schemes throughout South Africa enforce a land use policy on agricultural land which restricts the development of dwelling units on agricultural land. The number of units typically permitted is 1 per 10 ha. This has been used as the basis for what can be considered rural development. |

For the purposes of the ECBCP (2019) land use guidelines this policy (1 dwelling unit per 10 ha) was adapted and converted to an area-based unit. This was done by determining a reasonable area of influence of a single rural dwelling unit (200 $m^2$ including household gardens). This area was then multiplied by the number of units permitted in terms of the policy to be developed on 100 ha in a rural area (e.g., 10 units in 100 ha) in order to determine the development footprint on 100 ha. The ECBCP (2019) therefore defines rural housing and eco-estates as development footprints that cover 200 $m^2$ per 10 ha or 0.2 ha per 100 ha or 2 ha per 1000 ha, irrespective of the number of units.

Traditional/Communal and Low-medium density rural development

This land use type may range in density from low to medium density and describes rural housing development. Low-medium density is defined here as a development footprint (including gardens, agricultural fields and parking areas) covering between 0.2-10% of a designated area/property. It includes infrastructure associated with rural landscapes, including the villages, recreational and service facilities and agricultural fields/gardens. This land use type may result in impacts not in keeping with the land use management objectives of CBAs but may be in keeping with ESAs on a case-by-case basis and under specific authorisation conditions.

The following conditions should be observed for all rural development applications:

- Intensive recreational developments (e.g., golf and polo estates) which result in significant habitat loss, and which represent urban development outside the urban edge, are not compatible with CBA management objectives.
- Any infrastructural developments in CBAs should be avoided with respect to Traditional Communal Areas (Existing) and Rural Communal Settlements (New).
- Rural residential development (houses and infrastructure) within CBAs and ESAs MUST be clustered into distinct residential precincts.

Residential developments within ESAs must consider the functionality of the ESA, which may be related to connectivity and their role as biodiversity corridors. In these cases, residential houses and infrastructure should not disrupt or fragment the corridor or establish impermeable fences or boundaries to disrupt movement of fauna.

**High density urban residential development**

Urban residential development is described as the use of land primarily for human habitation, and comprises a dwelling house, group housing, hotels, hostels or flats, where more than 10% of the property area is developed. This land use zone corresponds to the SPLUMA scheduled land use purpose 'residential' associated with a municipal zoning scheme equivalent of medium to high density (such as Residential 1 or 2).

Urban residential land uses are generally not compatible with the land management objectives of CBAs or ESAs.

**Other urban influences**

*"Other Urban Influences" is a collective term for several urban related activities defined by SPLUMA including land use purposes for: commercial (light industrial), educational, institutional, business and recreation and mixed used developments. In all cases, the land uses permitted in these zones are not compatible with CBAs or ESAs.*

**Agriculture**

A range of agricultural activities have been considered in this land use type, including:

- Extensive game and livestock farming (where 'extensive' means low stocking rates over large areas, with minimal additional food supplementation).
- Intensive livestock and game ranching.
- Agricultural infrastructure, including agri-industrial facilities, agri-villages, buildings, houses, sheds and intensive animal production facilities (e.g., feedlots); and
- Arable land, including cultivation of irrigated and dryland crops, woodlots, orchards and multi- cropping systems.

This land use zone corresponds to the SPLUMA scheduled 'agricultural' land use purpose.

Many agricultural activities may impact on, and are largely incompatible with, biodiversity conservation objectives. If poorly managed, they may accelerate degradation by causing habitat loss, soil erosion and hydrological changes. Associated impacts vary from moderate to severe depletion of natural biota and disturbance of ecosystem function. However, agriculture may also contribute to the overall functionality of a landscape by maintaining connectivity necessary for the movement and foraging of animals.

Extensive Game and Livestock Farming

Extensive Livestock and Game farming is the utilisation of large areas of natural (unimproved) rangelands with the commercial objective of producing livestock or game animals (excluding feedlots and game breeding farms). This land use is considered to be compatible with biodiversity objectives of some CBAs and ESAs, under certain conditions, including:

- A biodiversity and veld condition assessment should underpin the calculation of carrying capacity.
- Game and livestock stocking rates should not exceed the recommended carrying capacity. Overgrazing, which results in a loss or degradation of an ecosystem, is in conflict with NEMA principals and is governed by Section 28 of NEMA which regulates the 'Duty of care and remediation of environmental damage'.
- Give preference to stocking game species that fall within their natural distribution range in the province.
- Sensitive habitats and species-rich areas should be set-aside for the purposes of biodiversity conservation.

- Ecologically and economically sustainable management is applied.

Intensive Game Breeding
Game breeding involves the subdivision of grazing veld into small camps (less than 100 ha) using fencing that does not allow free movement of naturally occurring wildlife (e.g., small mammals, reptiles, etc.).
Game breeding involves supplemental feeding of animals allowing stocking rates in excess of recommended carrying capacities and is considered a form of feedlot production. The forms of fencing used create impenetrable barriers to wildlife movement in the landscape.
Game breeding should not be permitted in CBAs or ESAs as is not considered compatible with the land management objectives for these categories.

Feedlots and agri-processing
Feedlots and agri-processing facilities are intensive farming operations which involve high animal densities and almost exclusive supplemented feeding and include piggeries, broiler houses, dairies, aquaculture and livestock feedlots. These facilities produce waste streams that require treatment and disposal and should be operated in line with authorisation conditions. Since pollution may be felt beyond the direct footprint of the land use activity itself, this land use activity may impact on ecosystem functionality.

Feedlots and agri-processing activities are not compatible with land management objectives for CBAs. They may be considered within Terrestrial ESAs (i.e., ESA 2 areas with imposed restrictions), but should not be considered in aquatic ESAs associated with CBA rivers.

Cultivation
A number of different types of cultivation have been aggregated into this land use type and is fundamentally used to describe any earth-turning activity or a replacement of natural vegetation, including:

- Irrigated crop cultivation
- Dryland crop cultivation (e.g., orchards, pastures, groves, plantation forestry)

Cultivation is not considered compatible with the land management objectives of CBAs and ESA 1.

**Open Space**

Open space areas, either public or private, are sites easily accessible for recreational purposes and activities for local and designated communities. These include parks, botanical gardens, and other open spaces as well as corridor linkages between open areas for passive recreational purposes.

This land use may correspond to either of SPLUMA's scheduled land use purposes under 'Public' or 'Community'.
The land use could potentially be compatible with the management objectives of CBAs and ESAs if it secures significant areas of natural habitat and manages human activities within them

**Low, high and general industry**

This land use encompasses industrial land use activities, such as low impact industry, general industry, and high impact industry. This land use zone corresponds to the SPLUMA scheduled 'Industrial' land use purpose. These land uses are not compatible with biodiversity conservation and should not be located in
CBAs or ESAs.

**Transport Services**

This land use accommodates transportation service functions and land uses such as airports, railway stations, petro-ports and truck stops, bus and taxi ranks and other transport depots. These activities correspond to the SPLUMA scheduled 'Transport' land use purpose.
The permitted land uses in this category are not compatible with CBAs and most ESAs.

***Roads and railways***

**Roads and railways include all existing and future planned linear infrastructure, such as hardened roads and railways. This land use zone corresponds to the SPLUMA scheduled 'Transport' land use purpose. These land uses are not consistent with the land management objectives of CBAs and ESAs. In cases where technical options are limited, these activities may only take place in CBAs and ESAs under specific conditions of authorisation and contingent on biodiversity offsets.**

**Other utilities**

'Other utilities' describes a range of services such as water and sewage treatment work, associated pipeline reticulation, and other linear infrastructure including canals and power lines. Utility land uses generally fall within the 'Government' land use purpose of SPLUMA where it is defined as "use of land by national, provincial or municipal government to give effect to its governance role." This may, in some cases, be extended to parastatal companies such as water service boards and Eskom. In the case of renewable energy on private land, municipal zoning schemes are used. The different types of utilities have been discussed separately below.

Linear Structures: Pipelines, Canals, Catchment Transfers and Power Lines
These activities include large bulk water transfer schemes and catchment transfers, power lines, canals, pipelines (including oil and gas).

Activities involving catchment transfers and canals will affect flow regimes in rivers and wetlands. For this reason, they are not compatible with the management objective for CBA rivers.

Power lines, substations and pipelines can be compatible with the management objective of CBAs, and ESAs provided that appropriate design (above-ground pipelines, below-ground power lines, etc) and routing is informed by expert specialist studies, and that strict conditions, such as limited vegetation clearing, bird collision and electrocution avoidance are enforced.

Water projects and power stations
Activities involving water damming will affect flow regimes in rivers, wetlands and estuaries. For this reason, they are not compatible with the management objective for CBA rivers. Small scale damming of river systems in free flowing/flagship rivers or upstream and instream of fish sanctuaries should not be permitted.

Power stations are accompanied by the need for significant volumes of water and the generation of wastewater (thermal and chemical pollution) and air pollution emissions. This land use activity is therefore undesirable in CBAs and ESAs. Considering the need for water, avoiding rivers, coastline buffers or estuarine buffers may not be feasible.
In both cases, infrastructure located within CBAs must be accompanied by biodiversity offset design and implementation.

Waterworks and Wastewater Treatment Works (WWTW)
This category includes installations serving rural and urban areas including water and wastewater treatment and includes associated reticulation infrastructure e.g., pump stations and pipelines. Water and WWTW's should not be located in CBAs or ESAs. WWTW's may have significant impacts on water quality, therefore discharge of effluent into Aquatic CBA 1 rivers should not be considered.

Renewable Energy
Renewable energy generation in the Eastern Cape mainly includes wind and solar (photovoltaic-PV). Other types of renewable energy generation include smaller biomass conversion (biogas and gasification) and generation of biodiesels from recycled oils.

Although the footprint of wind energy facilities is relatively small, the impact on bird and bat biodiversity may be considerable. Since the CBA map has been informed by these taxonomic groups it will reflect important areas for birds and bats. Considering that wind energy facilities are subject to the South African best practice guidelines for the monitoring of both taxonomic groups, wind energy facility may be considered in CBAs and ESAs in line with monitoring recommendations for birds and bats. Consideration of development, subject to expert studies of other biodiversity, in CBAs will require the development and implementation of biodiversity offsets.

Solar PV facilities are area-hungry activities which typically require considerable landscaping and the clearance of indigenous vegetation. Even if vegetation is left intact, a change in sunlight regime may alter the natural species composition. This activity is, therefore, not appropriate in CBA's or ESA's. In some cases, it may be acceptable to utilise ESAs, provided that connectivity is maintained in the development design.

Technologies such as biogas (reactors), gasification and biodiesel plants are typically undertaken on relatively small development footprints. The main impacts that need to be managed relate to air emissions
and waste streams. These technologies are, therefore, not compatible with CBA land/water management objectives, especially with respect to CBA rivers.

***Quarrying and Mining***

The quarrying and mining include all forms of mineral extraction and is sub-divided into three sub- categories:

- Prospecting and underground mining.
- Quarrying and opencast mining (includes strip mining, surface mining, dumping and dredging); and
- Associated mining infrastructure: residential areas, waste dumps, settling ponds and disposal sites, urban waste sites and landfill sites.

This land use zone corresponds to the SPLUMA scheduled 'mining' land use purpose.

None of the activities associated with these activities are compatible with biodiversity conservation and they should not be located in CBAs or ESAs.

The following additional conditions should be observed:

- Buffer widths should be determined and implemented using available policy and guidelines for all biodiversity features present; and

Any environmental management plan should align with the Mining and Biodiversity Guidelines (2014).

### 7.4.3 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans.

### 7.4.4 Strategic Water Source Areas

Strategic water source areas (*Figure 18*) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

Strategic water source areas can be regarded as natural "*water factories*", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

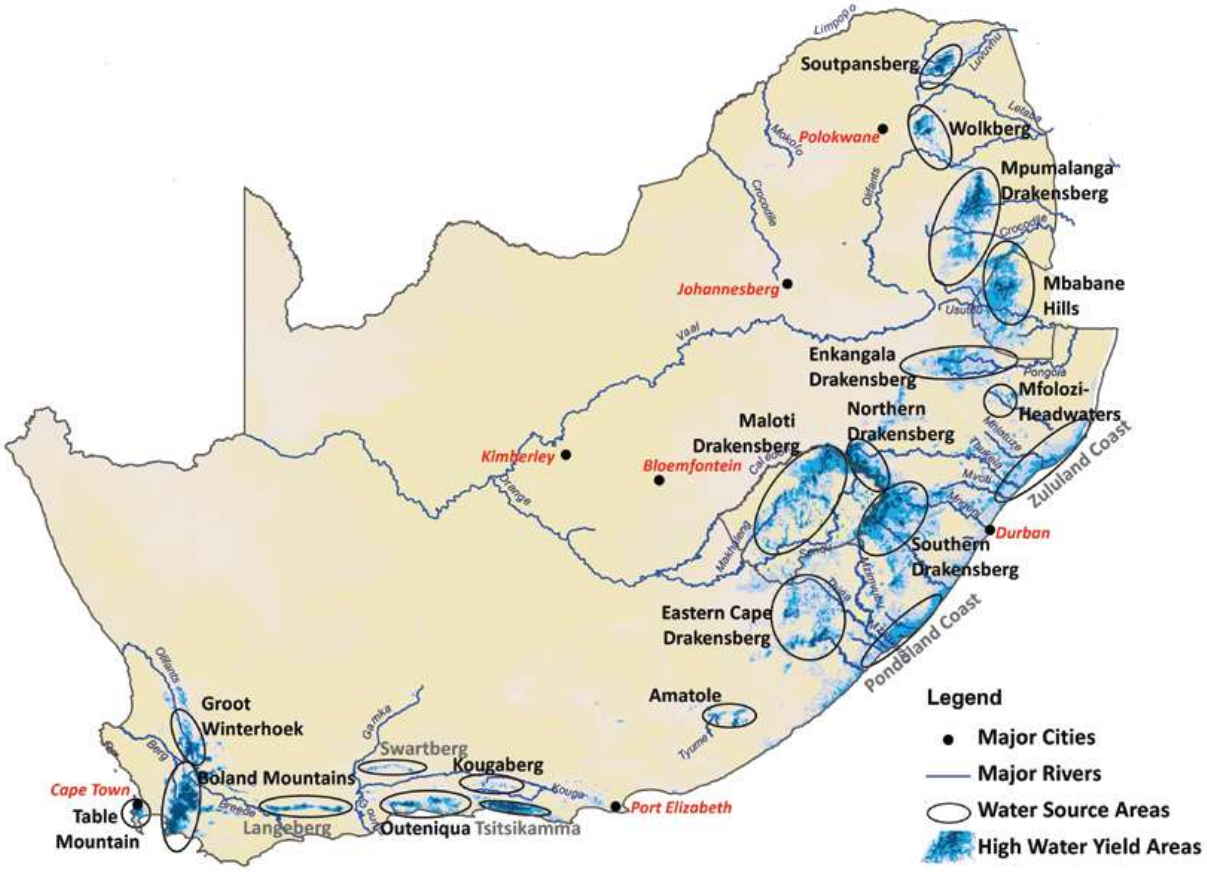


*Figure 18: South Africa Water Source Areas [Source: Nel, et al, 2013]*

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is considered to be one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem.

Overloading with nutrients and other pollutants from urban, agricultural and industrial waste has resulted in many dams shifting to an algae-dominated, or eutrophic, state. Sixty-five per cent of the country's dams are now estimated to be eutrophic or borderline eutrophic, with most of these algal blooms containing cyanobacteria (blue-green algae) that is toxic to human health. This renders water of

high quality unavailable if not treated, which coupled with failing water infrastructure, represents a major challenge to water security in the near future. Water managers are inevitably faced with finding new and innovative ways of improving both water quality and quantity to meet the increasing water demands of the country. Managing strategic water source areas is one way to meet this challenge.

### 7.4.5 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or '*FEPAs*'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves. Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

- Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of Conservation Concern (e.g., very restricted distributions in South Africa)
- River ecosystem types – 20% of total length per type
- Wetland ecosystem types – 20% of total area per type
- Wetland clusters – 20% of total area per wetland vegetation group
- Free-flowing rivers – 20% of total length per ecoregion group
- Priority estuaries – 100% of all priority estuaries, which already took into account biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or "riparian habitat" along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter ('food') in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its "riparian habitat" by a buffer area.

### 7.4.6 Key Biodiversity Areas

#### *Important Bird Areas*

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide,

which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all of the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.
To gather new data regularly and monitor IBA's in order to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

## 7.5 Vegetation and Ecological Processes and Corridors

### 7.5.1 Critical Biodiversity Areas

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, development within these areas is not encouraged. The following issues need to be considered when considering development within a CBA:

Are there alternative areas within the site but outside of the CBA that could be developed?
Does the project undermine the overall ecological functioning of the broad CBA area?
Can mitigation measures reduce the impact of the development on ecological processes?

### 7.5.2 Ecosystem Processes

Distinct ecological processes are generally associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g., environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow. However, the spatial components of processes have rarely been considered in conservation planning – an approach that is also especially useful for development planning in biodiversity hotspots.

### 7.5.3 Ecosystem Services

*"Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling"*. (Millennium Ecosystem Assessment (MEA), 2005)

Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide[18]:

- buffers against natural hazards such as fire and floods®
- carbon sequestration (storage), important for reducing the impacts of climate change®
- regulation of water supply®
- grazing for wild animals and livestock®
- natural spaces for recreation & tourism®
- the air we breathe®
- spiritual, ritual and ceremonies®
- horticultural & wildflower industries
- natural heritage®
- food, timber, fibre and medicinal plants®
- Rivers are central to human welfare and economic development. They provide:
- water for agricultural, industrial and domestic uses®
- flood attenuation and regulation®
- food and medicinal plants ®
- transport and/or purification of biodegradable wastes®
- tourism, recreational and cultural use®
- enhanced property values

Estuaries, together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to:

- subsistence fishing
- commercial fisheries (as they provide a refuge for commercial fishes when they are young)
- wildlife habitat e.g., nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles)
- tourism, recreational, cultural use and craft materials
- enhanced property values

Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:

- support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g., fire, pollination, seed dispersal), in response to global climate change
- are important areas for storing carbon to reduce the impacts of global climate change
- are important areas for regulating water supply (e.g., filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments)
- supply good quality water from mountain catchment areas, both surface and groundwater.
- the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services).
- are of important scenic value, contributing to tourism and the 'sense of place'. ®
- Coastal & marine areas
- Subsistence & commercial fishing (food)

[18] Within the study area, terrestrial ecosystem services are marked (e).

- Medicinal & Cosmetic resources e.g., kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
- Mining (sand and heavy mineral)
- Recreational value (sport and fishing)
- Retail value (market-value of housing)®

Net Primary production®: This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations' ability to maintain this ecosystem process. This ecological process is especially significant for the ORT, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

Water production: In more arid areas, many municipalities and towns rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

Species movement corridors and climatic refuges: Global climate change is undoubtedly a threat in the coming decades. A key action to mitigate its effects is the maintenance of species' ability to migrate to new locations as the climatic conditions which they require move across the landscape. These corridor and refuge migration strategies occur on both a micro and macro level. On the macro scale corridors provide for species movement at landscape scales. This entails the ability of fauna and flora to undertake large scale movements towards areas which continue to provide the conditions required by a species for growth and reproduction. Movements could entail migrations of up to hundreds of kilometres, and corridors of mostly natural or near natural vegetation across the landscape are needed to permit this to occur. Climactic refuges can be localized areas that have moderated climates – such as mountain kloofs and south facing slopes. These areas provide cooler habitats where species under threat from changing climates can colonise or species and vegetation not widely found in surrounding area.

### 7.5.4 Ecological Support Areas

These include supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. The ESA'S are not well defined in the ECBCP (refer to Section 2.1.4). ESAs are generally extensions to the CBA area incorporating small areas that are perhaps no longer natural, or are comprised of secondary vegetation, generally following the drainage line ecological corridors within the wider surrounding landscape that will improve connectivity.

### 7.5.5 Critical/Important Terrestrial Habitats

Special Habitats include areas that are rare within a region, or which support important species, ecosystems or ecological processes. Species of Conservation Concern refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal or other organisms (e.g., reptiles, insects etc) that have been assessed and classified according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least

Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such red data species that are under threat of extinction.

### 7.5.6 Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a landowner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

#### *Eradication protocol*

The act required the removal of these species, being the responsibility of the landowner, as described in Table 12 below.

Table 12: Legislation regarding invasive alien species.

| |
|---|
| The National Environmental Management Act: Alien and Invasive Species Act (18 September 2020) stipulates the following:<br>*6. Control measures*<br>*(1) In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply.*<br>*(2) Such control measures may relate to –* |

*(I) the control of weeds and invader plants.*
*(3) A control measure may –*
*(a) contain a prohibition or an obligation with regard to any matter referred to in subsection (2).*
*(5) Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence.*
In this regard, Government Notice R. 598 – National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Gazette number 37885), dated August 2014, further stipulates the following:
*CHAPTER 2: CATEGORIES OF LISTED INVASIVE SPECIES*
***2. Category 1a: Listed Invasive Species***
*(1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.*
*(2) A person in control of a Category 1a Listed Invasive Species must-*
*(a) comply with the provisions of section 73(2) of the Act.*
*(b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and*
*© allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.*
*If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.*

***3. Category 1b: Listed Invasive Species***
*(1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.*
*(2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.*
*(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.*
*(4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.*
***4. Category 2: Listed Invasive Species***
*(1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.*
*(2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.*
*(3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.*
*(4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.*
*(5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.*

*(6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.*

***5. Category 3: Listed Invasive Species***

*(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.*

*(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.*

*(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.*

*CHAPTER 7: ISSUING, AMENDMENT AND CANCELLATION OF PERMITS*

*29. Sale or transfer of alien and listed invasive species*

*(1) If a permit-holder sells a specimen of an alien or listed invasive species or sells the property on which a specimen of an alien or listed invasive species is under the permit-holder's control, the new owner of such specimen or such property must apply for a permit in terms of Chapter 7 of the Act.*

*(2) The new permit-holder contemplated in sub-regulation (1) will be subject to the same conditions as the permit-holder who has sold the specimen of an alien or listed invasive species, or the property on which a specimen of an alien or listed invasive species occurs, unless specific circumstances require all such permit conditions to be revised, in which case full reasons must be giving in writing by the issuing authority.*

*(3) The seller of any immovable property must, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed invasive species on that property.*

*CHAPTER 9: COMPLIANCE AND ENFORCEMENT*

*35. Offences and penalties*

*(1) Any offence committed in terms of section 101 of the Act shall, upon conviction, carry the penalties referred to in section 102 of the Act.*

*(2) Any person who contravenes or fails to comply with a provision of these regulations is guilty of an offence and is liable, on conviction, to-*

*(a) a fine not exceeding five million rand, and in the case of a second or subsequent conviction, to a fine not exceeding R 10 million; or*

*(b) imprisonment for a period not exceeding 10 years; or*

*© to both such fine and imprisonment.*

The seller of any immovable property must also, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed IAPs on the property. Property sales agreements dated 1 October 2014 and onwards, should also incorporate a clause in terms of which the purchaser acknowledges that he has acquainted himself with the extent and the nature of the property he is buying and that he accepts the property as such, including the vegetation on the property.

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the construction EMP, and a detailed action plan compiled and implemented by the ECO. Any seed-bearing material is to be disposed of at a registered landfill.

# 7.6 Appendix E: Abbreviations & Glossary

## 7.6.1 Abbreviations

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| CARA | Conservation of Agricultural Resources Act, Act 43 of 1983 |
| CBA | Critical Biodiversity Area |
| DESTEA | Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs |
| DEA | Department of Environmental Affairs (*now DFFE, see below*) |
| DFFE | The Department of Environmental Affairs (DEA) was renamed the Department of Forestry and Fisheries and the Environment (DFFE), incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries. |
| DEMC | Desired Ecological Management Class |
| DWS | Department of Water Affairs and Sanitation |
| DWAF | Department of Water Affairs and Forestry (former department name) |
| EA | Environmental Authorisation |
| ECO | Environmental Control Officer |
| EIA | Environmental Impact Assessment |
| EIR | Environmental Impact Report |
| EMC | Ecological Management Class |
| EMP | Environmental Management Plan |
| EMPr | Environmental Management Programme report |
| ER | Environmental Representative |
| ESS | Ecosystem Services |
| IAP's | Interested and Affected Parties |
| IEM | Integrated Environmental Management |
| LM | Local Municipality |
| masl | meters above sea level |
| NBA | National Biodiversity Assessment |
| NEMA | National Environmental Management Act, Act 107 of 1998 |
| NFA | National Forests Act |
| NEM:BA | National Environmental Management: Biodiversity Act 10 of 2004 |
| NFA | National Forest Act, Act 84 of 1998 |
| PEMC | Present Ecological Management Class |
| PES | Present Ecological State |
| PNCO | Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974). |
| RDL | Red Data List |
| RHS | Right Hand Side |
| RoD | Record of Decision |
| SANBI | South African National Biodiversity Institute |
| SDF | Spatial Development Framework |
| SoER | State of the Environment Report |
| SSC | Species of Special Concern |
| ToPS | Threatened of Protected Species |
| ToR | Terms of Reference |
| +ve | Positive |
| -ve | Negative |

## 7.6.2 Glossary

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| Alien Invasive Species (AIS) | An alien species whose introduction and/or spread threaten biological diversity (Convention on Biological Diversity). Note: "*Alien invasive species*" is considered to be equivalent to "*invasive alien species*". An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity (*IUCN*). |
| Best Environmental Practice | The application of the most appropriate combination of environmental control measures and strategies (Stockholm Convention). |
| Best Management Practice | Established techniques or methodologies that, through experience and research, have proven to lead to a desired result (BBOP). |
| Biodiversity | Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems. |
| Biodiversity Offset | Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people's use and cultural values associated with biodiversity (BBOP). |
| Bioremediation | The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition. |
| Boundary | Landscape patches have a boundary between them which can be defined or fuzzy (Sanderson and Harris, 2000). The zone composed of the edges of adjacent ecosystems is the boundary. |
| Connectivity | The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity. |
| Corridors | Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems, or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as "steppingstones" that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments. |
| Critically Endangered (CR) | A category on the IUCN Red List of Threatened Species which indicates a taxon is facing an extremely high risk of extinction in the wild (*IUCN*). |
| Cultural Ecosystem Services | The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g., knowledge systems, social relations, and aesthetic values (Millennium Ecosystem Assessment). |
| Cumulative Impacts | The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project's impact is therefore one part of the total cumulative impact on the environment. The analysis of a project's incremental impacts combined with |

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| | the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation (BBOP). |
| Data Deficient (DD) | A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat(IUCN). |
| Degraded Habitat/Land | Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management. |
| Disturbance | An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process. |
| Ecological Processes | Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened. |
| Ecosystem Status | Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving most species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem (Millennium Ecosystem Assessment). |
| Ecosystem Services | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat. |
| Ecosystem | All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. |
| Ecotone | The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions; forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of |

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| | ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone. |
| Edge | The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent. |
| Emergent Tree | Trees that grow above the top of the canopy |
| Endangered (En) | Endangered terrestrial ecosystems have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised.<br>A taxon (species) is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild (*IUCN*). |
| Endemic | A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threated Species. |
| Environment | The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects. |
| Exotic | Non-indigenous; introduced from elsewhere, may also be a *weed* or alien *invasive* species. Exotic species may be invasive or non-invasive. |
| Ecological Structure | The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions. |
| Ecological Function | How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly. |
| Ecological Pattern | The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them. |
| Ecological Process | Includes *Physical processes* [Climate (precipitation, insolation), hydrology, geomorphology]; *Biological processes* [Photosynthesis, respiration, reproduction]; *Ecological processes* [Competition, predator-prey interactions, environmental gradients, life histories] |

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| Fragmentation (Habitat Fragmentation) | The 'breaking apart' of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occurs. |
| Habitat Banking | A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time (IEEP). |
| Habitat | The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival. |
| IFC PS6 | International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC) |
| Indicator | Information based on measured data used to represent an attribute, characteristic, or property of a system. |
| Indicator species | A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition. |
| Indigenous | Native; occurring naturally in a defined area. |
| Indigenous Species (Native species) | A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (*Bern Convention 1979*).<br>A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy using its natural dispersal systems (*modified after the Convention on Biological Diversity*) |
| Indirect Impact | Impacts triggered in response to the presence of a project, rather than being directly caused by the project's own operations (BBOP) |
| Intact Habitat / Vegetation | Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes. |
| Intrinsic Value | The inherent worth of something, independent of its value to anyone or anything else. |
| Keystone Species | Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web. |
| Landscape | An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems (Millennium Ecosystem Assessment). |
| Landscape Approach | Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations (FAO). |
| Landscape connectivity | The degree to which the landscape facilitates or impedes movement among resource patches. |
| Least threatened / Least Concern (LC) | These ecosystems have lost only a small proportion (more than 80 % remains) of their original natural habitat and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild). |

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| | A taxon (species) is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (*IUCN*). |
| Matrix | The "*background ecological system*" of a landscape with a high degree of connectivity. |
| Natural Forest (Indigenous Forest) | The definition of "*natural forest*" in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: 'A natural forest means a group of indigenous trees • whose crowns are largely contiguous • or which have been declared by the Minister to be a natural forest under section 7(2)<br>This definition should be read in conjunction with Section 2(1)(x) which states that 'Forest' includes:<br>• A natural forest, a woodland, and a plantation<br>• The forest-produce in it; and<br>• The ecosystems which it makes up.<br>The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (Podocarpus latifolius) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as:<br>• A generally multi-layered vegetation unit<br>• Dominated by trees that are largely evergreen or semi-deciduous<br>• The combined tree strata have overlapping crowns, and crown cover is >75%<br>• Grasses in the herbaceous stratum (if present) are generally rare<br>• Fire does not normally play a major role in forest function and dynamics except at the fringes<br>• The species of all plant growth forms must be typical of natural forest (check for indicator species)<br>• The forest must be one of the national forest types |
| Near Threatened (NT) | A taxon (species) is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (*IUCN*). |
| Patch | A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements. |
| Protected Area | A clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. |
| Range restricted species | Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited extent of occurrence (EOO):<br>• For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km2). |
| Refugia | A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting. |
| Resilience | The capacity of a natural system to recover from disturbance (OECD). |
| Rehabilitation | Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/ or minimised. |

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| | Rehabilitation emphasizes the reparation of ecosystem processes, productivity, and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure (BBOP). |
| Restoration | The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions (IFC). |
| Riparian | Pertaining to, situated on, or associated with the banks of a watercourse, usually a river or stream. |
| River Corridors | River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas. |
| Sustainable Development | Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED). |
| Terrestrial | Occurring on, or inhabiting, land. |
| Threatened Species | Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species (*IUCN*). Any species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate (EU). |
| Traditional Ecological Knowledge | Knowledge, innovations, and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry (CBD). |
| Transformation | In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments. |
| Transformed Habitat/Land | Land that has been significantly impacted upon because of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states. |
| Tributary | A small stream or river flowing into a larger one. |
| Untransformed Habitat/Land | Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes. |

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| Vulnerable (Vu) | Vulnerable terrestrial ecosystems have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat.<br>A taxon (species) is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (*IUCN*). |
| Watercourse | Natural or man-made channel through or along which water may flow.<br>A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake, or dam into which, or from which, water flows.<br>and a reference to a watercourse includes, where relevant, its bed and banks; |
| Weed | An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed. |
| Wetlands | A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow. |
| Catchment | In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points. |
| Estuary | a partially or fully enclosed body of water -<br>(a) which is open to the sea permanently or periodically; and<br>(b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land. |
| Instream habitat | Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse; |
| Riparian Habitat | Includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas. |

## 7.7 Annexure F: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included I the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed will be managed / controlled as set out under mitigating measures and as detailed in this section for the more significant impacts during the operational phase.

### 7.7.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern *must* be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.

- Stripped vegetation *should* be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and *must* not be disturbed, upset or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site *must* be done as described in the Rehabilitation Plans.

*Flora search and Rescue*

The following flora relocation plan is recommended:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of Conservation Concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a protected area.

### 7.7.2 Alien and Invasive Plan Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species *must* be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

### 7.7.3 Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers *should* also be informed or otherwise involved.

- Enclosed areas for food preparation should be provided and the Contractor *must* strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making *must* be strictly prohibited.
- The Contractor *should* take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.
- The Contractor *must* ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor *must* supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and "hot work" *must* be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area *must* be away from flammable stores. All events must be under management's supervision and a fire extinguisher *will* be immediately available. "Low-smoke" fuels must be used (e.g., charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor *must* take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

### 7.7.4 Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

### 7.7.5 Dust

- To manage complaints relation to impacts on the nearby communities, a dust register *will* be developed.
- If required, water spray vehicles *will* be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens *should* be used to reduce wind and dust in open areas.

### 7.7.6 Infrastructural Requirements

*Topsoil*

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

### *Stormwater and Erosion Control*

- Stormwater Management Plans *must* be developed for the site and should include the following:
- The management of stormwater during construction.
- The installation of stormwater and erosion control infrastructure.
- The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater *must* be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes *should* be profiled at a maximum 1:3 gradient.
- Diversion channels *should* be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation *must* be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections *will* be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas *must* be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

### *Site Office / Camp Sites*

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

### *Operating Procedures in the Site*

- Construction shall only take place within the approved demarcated site.
- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area. It is considered unlikely, however, that these species will be affected by the proposed activity.

### *Excavations*

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.

- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previous stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

### *Rehabilitation of Processing and Excavation Areas*

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This *shall* be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This *must* be done in conjunction with the ECO.
- Final rehabilitation *must* comply with the requirements mention in the Rehabilitation Plan.

## 7.7.7 Rehabilitation Plan

### *Rehabilitation Objective*

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

### *Topsoil and Subsoil Replacement*

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contract to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

### *Revegetation*

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

| Botanical name | Common name | Approx seed mixture /Ha |
|---|---|---|
| ***Cynodon dactylon*** | Kweek | 12 kg/ Ha |
| ***Eragrostis curvula*** | Weeping Love Grass | 6 kg/ Ha |
| ***Eragrostis tef*** | Teff | 2 kg/ Ha |
| ***Digitaria eriantha*** | Smuts Grass | 4 kg/ Ha |
| **Other indigenous veld grasses can be added to the seed mix** | | ± 4 kg/Ha |

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site
- Stabilise disturbed soil and rock faces
- Minimize surface erosion and consequent siltation of natural water course located on site
- Control wind-blown dust problems
- Enhance the physical properties of the soil
- Re-establish nutrient cycling
- Re-establish a stable ecological system
- Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

### *Drainage and Erosion Control*

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e., conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation
- Existing vegetation will be retained as far as possible to minimize erosion problems.

### *Visual Impacts Amelioration*

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas

## 7.7.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

### 7.7.9 Closure objectives and extent of alignment to pre-construction environment

*Closure Objectives*

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

# 7.8 Appendix G: Specialist Declaration, Profile & Registration

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

| | (For official use only) |
|---|---|
| File Reference Number: | |
| NEAS Reference Number: | DEA/EIA/ |
| Date Received: | |

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

**PROJECT TITLE**

**TANGO WEF**

**Kindly note the following:**

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

**Departmental Details**

**Postal address:**
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

**Physical address**:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

Details of Specialist, Declaration and Undertaking Under Oath

Page 1 of 3

## 1. SPECIALIST INFORMATION

| | | | | |
|---|---|---|---|---|
| Specialist Company Name: | None | | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 4 | Percentage Procurement recognition | 100 % |
| Specialist name: | Jamie Pote | | | |
| Specialist Qualifications: | BSc (Hons) | | | |
| Professional affiliation/registration: | SACNASP (115233) – Ecological Science<br>IAIAsa (5045) | | | |
| Physical address: | | | | |
| Postal address: | Postnet Suite 57, PBag X13130, Hunewood | | | |
| Postal code: | 6013 | Cell: | | |
| Telephone: | | Fax: | | |
| E-mail: | jamiepote@gmail.com | | | |

## 2. DECLARATION BY THE SPECIALIST

I, Mr Jamie Pote_____, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

N/A

Name of Company:

30/05/2023

Date

Details of Specialist, Declaration and Undertaking Under Oath

Page 2 of 3

**3. UNDERTAKING UNDER OATH/ AFFIRMATION**

I, Mr Jamie Pote_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

N/A

Name of Company

30/05/2023

Date

Signature of the Commissioner of Oaths

2023-05-30

Date

SUID-AFRIKAANSE POLISIEDIENS
VISPOL AANKLAG KANTOOR
HUMEWOOD
2023 -05- 30
VISPOL COMMUNITY SERVICE CENTRE
HUMEWOOD
SOUTH AFRICAN POLICE SERVICE

Details of Specialist, Declaration and Undertaking Under Oath

Page 3 of 3

SACNASP

South African Council for Natural Scientific Professions

**herewith certifies that**

**Jamie Robert Claude Pote**

Registration Number: 115233

**is a registered scientist**

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Ecological Science (Professional Natural Scientist)

Effective **20 July 2016** Expires **31 March 2024**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

# Jamie Pote

BIODIVERSITY ADVISOR, ECOLOGIST AND ENVIRONMENTAL SCIENTIST

## CONTACT

(+27) 76 888 9890
jamiepote@live.co.za
Port Elizabeth, South Africa
Linkedin.com
Jamiepote
Bluesky-SA

## EDUCATION

Bachelor of Science
*Rhodes University*
2002 (Botany & Environmental Science)

Bachelor of Science (Honours)
*Rhodes University*
2003 (Botany)

Professional Natural Scientist
*SACNASP: 2016 (Ecological Science)*

## SERVICES

*Terrestrial Biodiversity Specialist Assessments*
*IFC PS6 Biodiversity & Critical Habitat Assessments*
*Terrestrial Biodiversity Compliance Statements*
*Geographic Information Systems*
*Environmental Management Plans & Programmes*
*Environmental Compliance & Monitoring*
*Independent Environmental & Ecological reviews*
*Bioremediation, Restoration & Rehabilitation Plans*
*Permit and License applications (Flora & Fauna)*
*Flora Search & Rescue Plans & Relocations*
*Invasive Alien Plant Control & Management Plans*
*Environmental & Mining Applications*

## ABOUT ME

*18 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 250 projects in southern, western and central Africa. Environmental Assessment Practitioner on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. Advanced GIS mapping tools and Analysis.*

## EXPERIENCE AND CLIENTS

Key Sectors

- *Wind, Solar Energy Facilities*
- *Infrastructure and Housing*
- *Agriculture and Forestry*
- *Mining and Industrial*

Key Projects

- *Over 250 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.*
- *Basic Assessments, Mining applications and compliance monitoring on over 50 projects for various clients including the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape, including over 300 individual borrow pits.*
- *South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Pre-Construction compliance.*
- *Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.*
- *Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing clients.*
- *Various agricultural expansion and infrastructure projects.*
- *Various wind and solar energy and associated infrastructure projects.*
- *Numerous infrastructure projects including electrical, water and roads.*
- *Various Environmental Management and Rehabilitation Plans.*

24/06/2021

*Mr Jamie Pote (BSc (Hons) PR. Sci. Nat.*

## PROJECT EXPERIENCE

ENERGY PROJECTS (WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE)

- Terrestrial Biodiversity Screening for proposed WEF, Beaufort West, Western Cape (ZA) 2023
- Terrestrial Biodiversity Walkdown for Koup 1 & 2 WEF, Beaufort West, Western Cape (ZA) 2023
- Terrestrial Biodiversity Assessment for Harmony Kalgold PV, Mahikeng, North West (ZA) 2022
- Terrestrial Biodiversity Assessment for Bonsmara PV, Kroonstad, Free State (ZA) 2023
- Terrestrial Biodiversity Screening for proposed WEF, Springbok, Northern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Harmony Chemwes PV, Klerksdorp, North West (ZA) 2022
- Terrestrial Biodiversity Assessment for Harmony Target PV, Welkom, Free State (ZA) 2022
- Terrestrial Biodiversity Assessment for MTN Mast, Louterwater, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for MTN Mast, Mount Stewart, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for MTN Mast, Pearston, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for MTN Mast, Roussouw, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Screening for proposed PV & WEF, Beaufort West, Western Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for WKN Soutrivier WEF, Victoria West, Northern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for WKN Taaibos WEF, Victoria West, Northern Cape (ZA) 2022
- Terrestrial Biodiversity Screening for proposed PV, Beaufort West, Western Cape (ZA) 2022
- Terrestrial Biodiversity Screening for proposed WEF & PV, Secunda, Mpumalanga (ZA) 2022
- Terrestrial Biodiversity Screening for proposed WEF, Standerton, Mpumalanga (ZA) 2022
- Terrestrial Biodiversity Walkdown for Phezukomoya WEF, Noupoort, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Walkdown for San Kraal WEF, Noupoort, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Walkdown for Hartebeeshoek WEF, Noupoort, Eastern Cape (ZA) 2023
- Terrestrial Biodiversity Amendment for Banna ba Pifhu WEF, Humansdorp, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Seekoei PV, Middleburg, Northern Cape (ZA) 2022
- Terrestrial Biodiversity Screening for proposed PV, Kroonstad, Free State (ZA) 2022
- Terrestrial Biodiversity Assessment for Paulputs WEF, Pofadder, NC (ZA) 2021
- Terrestrial Biodiversity Assessment for Komas WEF, Kleinsee, NC (ZA) 2021
- Preliminary Biodiversity Screening and GIS mapping for Balekani Photovoltaic Solar Project (SZ) 2020
- Preliminary Biodiversity Screening and GIS mapping for Sihhoye Photovoltaic Solar Project (SZ) 2020
- Preliminary Biodiversity Screening and GIS mapping Mpaka Photovoltaic Solar Project (SZ) 2020
- Preliminary Biodiversity Screening and GIS mapping for Chiwelwa Hydroelectric project (ZM) 2020
- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB (ZA) 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010

TERRESTRIAL BIODIVERSITY ASSESSMENTS AND COMPLIANCE STATEMENTS

- Terrestrial Biodiversity Assessment for Glen Ewan Private School, Komani (ZA) 2023
- Terrestrial Biodiversity Assessment for Hard Rock Agriculture, Addo, EC (ZA) 2022
- Terrestrial Biodiversity Assessment for Coegakammakloof Chicken Houses, Addo, EC (ZA) 2022
- Terrestrial Biodiversity Assessment for Umziwabantu Agriculture, Addo, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Compliance Statement for Middledrift PV, Addo, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Compliance Statement for Disco PV, Addo, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Mbashe AmaXhosa Royal House, Mbashe, Eastern Cape 2022
- Terrestrial Biodiversity Assessment for Nordex Roggeveld CTF, Western Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Erf 805 Amsterdamhoek, Eastern Cape (ZA) 2022

- Terrestrial Biodiversity Assessment for Addo Fuel Depot, Addo, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Tsomo WTW, CHDM, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Beacon Bay Memorial Park, Buffalo City, Eastern Cape 2022
- Terrestrial Biodiversity Assessment for Ph 5 Nxamagele Reservoir & Pipeline, CHDM, EC (ZA) 2022
- Terrestrial Biodiversity Assessment for Ph 9 Water Pipeline to Sada WTW, Hewu, Eastern Cape 2022
- Terrestrial Biodiversity Assessment for Erf 5707 Beacon Bay, Buffalo City, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Erf 8077 Uitenhage Fuel Station, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Farm 3/599 Buffalo City, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Sontule Citrus expansion, Addo, Eastern Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Kurland WTW and Pipeline, Western Cape (ZA) 2022
- Terrestrial Biodiversity Assessment for Addo Offices, Addo, Eastern Cape (ZA) 2021
- Terrestrial Biodiversity Assessment for Blaauwater Farms, Eastern Cape 2021
- Terrestrial Biodiversity Assessment for Buffelshoek Farm, Loerie, Eastern Cape 2021
- Terrestrial Biodiversity & Aquatic Assessment & Review, Falcon Ridge Dam, Addo, EC 2021
- Terrestrial Biodiversity Assessment for Gubenxa Valley Deciduous Fruit, Eastern Cape 2021
- Terrestrial Biodiversity Assessment (Little Chelsea Mixed-use) 2021
- Terrestrial Biodiversity Compliance Statement (Maidenhead Farm) 2021
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project Grid Interconnection 2021
- Terrestrial Biodiversity Compliance Statement (Lahlangubo River Bridge) 2021
- Terrestrial Biodiversity Assessment (Mbashe access roads - 3 sites) 2021
- Terrestrial Biodiversity Assessment for Burlington Farm Citrus Development, Cookhouse, EC 2020
- Terrestrial Biodiversity Compliance Statement: CHDM Cluster 9 Phase 3D Pipeline 2020
- Terrestrial Biodiversity Review, Mulilo Total Hydra Storage Project BESS 2020
- Terrestrial Biodiversity Assessment (Mbashe housing projects, Dutywa & Willowvale) 2020
- Terrestrial Biodiversity Assessment (Helpmekaar Dam, Tarkastad) 2020
- Terrestrial Biodiversity Assessment (Herbertsdale pipeline, Mossel Bay) 2020
- Terrestrial Biodiversity Assessment (Keurbooms Erf 155, Keurboomstrand) 2020
- Terrestrial Biodiversity Assessment (Lowmar Hydroelectric Project, Cradock) 2020
- Terrestrial Biodiversity Assessment (Mossel Bay Gas Power Plant) 2020
- Terrestrial Biodiversity Assessment (Erf 1820, Mthatha) 2020
- Terrestrial Biodiversity Assessment (Newlyn Manganese Terminal, Coega SEZ) 2020
- Terrestrial Biodiversity Assessment Thornhill Phase 2 Sanitation Link 2020

- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS (IFC PS6)

- DBSA Environmental & Social Safeguards Standards 9: Biodiversity Conservation and Sustainable Management Assessment: The Ilitha Fibre Project, Ethekwini 2021
- Critical Habitat & Biodiversity Assessment - KruiseVallei Hydroelectrical Energy Project 2020
- Critical Habitat & Biodiversity Assessment & Walkdown- Brandvallei WEF, Northern Cape 2021
- Critical Habitat & Biodiversity Assessment & Walkdown- Rietkloof WEF, Northern Cape 2021
- Critical Habitat & Biodiversity Assessment & Walkdown- Karreebosch Grid Connection, NC 2021
- Critical Habitat & Biodiversity Assessment & Walkdown- Karreebosch WEF, Northern Cape 2021
- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

SPECIALISED ECOLOGICAL REPORTS AND REVIEWS

- Section 24G Assessment and Rehabilitation Plan for Burlington Farm, Cookhouse, Eastern Cape 2022
- Alien Invasive Plant (AIP) Compliance Screening, Astron Depot, Cape Town, Western Cape (ZA) 2022
- Alien Invasive Plant (AIP) Compliance Screening, Astron Depot, Buffalo City, Eastern Cape (ZA) 2022

- Alien Invasive Plant (AIP) Compliance Screening, Astron Depot, Gqeberha, Eastern Cape (ZA) 2022
- Rebels Vlei Riparian delineation, Kirkwood, Eastern Cape 2021
- Buck Kraal Dam Rehabilitation Plan Review, Addo, Eastern Cape 2020
- Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMB 2015
- Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape 2014
- Mapping and Ecological services for Congo Agriculture, Republic of Congo 2013
- Rehabilitation Plan for Nieu Bethesda, Eastern Cape 2011
- Mapping of pipeline for Kenton Water Board, Eastern Cape 2010
- Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB 2010
- Representative for landowner group for Seaview burial Park, NMB 2010
- Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB 2008
- Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape 2007
- Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape 2006
- Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape 2003

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

- Terrestrial Biodiversity Amendment for Transnet/Portnet CDC SEZ Mn Terminal 2023
- Terrestrial Biodiversity Assessment for Machani to Taleni SPS Access Road (SPM) 2022
- Terrestrial Biodiversity Assessment for Matonga to Mantlaneni Access Road (SPM) 2022
- Terrestrial Biodiversity Assessment for Newlyn Mn Terminal & conveyor (CDC IDZ), NMB 2021
- Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB 2013
- Ecological Assessment Review for Penhoek Road widening, Eastern Cape 2012
- Ecological Assessment for R61 road widening, Eastern Cape 2012
- Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB 2010
- Botanical Assessment for Motherwell - Blue Water Bay Road, NMB 2010
- Ecological Assessment for Port St John Road, Eastern Cape 2010
- Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape 2009
- Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB 2009
- Botanical Assessment for Manganese Conveyor Screening Report, NMB 2008
- Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape 2006

MINING PROJECTS

- Ecological Assessment for Bochum Borrow Pits, Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines) 2013
- Ecological Assessment for Thulwe Road Borrow Pits, Limpopo 2013
- Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana 2010
- Botanical Assessment for Zwartenbosch Quarry, Eastern Cape 2008
- Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape 2008
- Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape 2008
- Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape 2008
- Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape 2008
- Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape 2008

- Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape 2008
- Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape 2008
- Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape 2008
- Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape 2008
- Regional Botanical Map for mining prospecting permit, Welkom 2008
- Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit – Jeffreys Bay, Eastern Cape 2007
- Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms River/Kareedouw, Eastern Cape 2007
- Biophysical Assessment for Humansdorp Quarry, Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape 2006
- Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB 2006
- GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape 2006
- Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo 2006
- Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape 2006

POWERLINE INFRASTRUCTURE PROJECTS

- Terrestrial Biodiversity Assessment for Paulputs WEF Grid connection, Pofadder, NC (ZA) 2021
- Terrestrial Biodiversity Assessment for Komas WEF Grid connection, Kleinsee, NC (ZA) 2021
- Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM 2016
- Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM 2016
- Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline, NC 2015
- Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape 2013
- Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, EC 2012
- Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB 2012
- Botanical Assessment for Dedisa-Grassridge Powerline, EC 2010
- Ecological Assessment for Grahamstown-Kowie Powerline, EC 2010
- Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB 2009
- Botanical Assessment for Eskom Powerline - Albany-Kowie, EC 2009
- Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB 2006
- Botanical Assessment for Eskom Power line – Tyalara-Wilo, Eastern Cape 2006
- Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape 2004

PIPELINE INFRASTRUCTURE PROJECTS

- Terrestrial Biodiversity Assessment for Hewu Phase 9 Raw Water Pipeline to Sada WTW 2022
- Terrestrial Biodiversity Assessment for CHDM Ph 5 Nxamagele Reservoir & Pipeline (ZA) 2022
- Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape 2020
- Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3) 2018
- Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme 2017
- Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey) 2017
- Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape 2016

- Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4) 2013
- Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5) 2013
- Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng 2012
- Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape 2010
- Basic Botanical Assessment for Chatty Sewer, NMB 2010
- Species of Special Concern Mapping for Seaview Pipeline, NMB 2009
- Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB 2009
- Map Production for Russell Rd Stormwater, NMB 2008
- Basic Botanical Assessment for Albany Pipeline, Eastern Cape 2008
- Environmental Risk Assessment for Elands River pipeline, Eastern Cape 2007
- Detailed Botanical Assessment for Motherwell Pipeline, NMB 2007
- Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape 2007
- Botanical & Floristic Report for Hankey pipeline, Eastern Cape 2006
- Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape 2004

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

- Ecological Assessment for Amalinda crossing, BCM, Eastern Cape 2019
- Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape 2019
- Ecological Assessment for Nelson Mandela University Access Road, NMB 2019
- Botanical Assessment for Zachtevlei Dam (Lady Grey), Eastern Cape 2017
- Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape 2017
- Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape 2012
- Botanical Assessment for Jansenville Cemetery, Eastern Cape 2009
- Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB 2008
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape 2007
- Botanical Assessment for PE Airport Extention, NMB 2006
- Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape 2006

HOUSING DEVELOPMENT PROJECTS

- Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape 2020
- Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay 2019
- Ecological Assessment Portion 21-23 and 41 of Farm 807, Gonubie, Buffalo City 2019
- Ecological Assessment for Emerald Sky Housing Project, BCMM 2019
- Ecological Assessment for Erf 14, Kabega, Port Elizabeth 2017
- Ecological Assessment for Fairwest Rental Housing, Port Elizabeth 2017
- Ecological Assessment for Hankey Housing, Kouga District Municipality 2015
- Ecological Assessment for Lebowakgoma Housing, Limpopo 2013
- Ecological Assessment for Giyani Development, Limpopo 2013
- Ecological Assessment for Palmietfontein Development, Limpopo 2013
- Ecological Assessment for Seshego Development, Limpopo 2013
- Botanical Assessment for Sheerness Road, BCM, Eastern Cape 2013
- Ecological Assessment for Ethembeni Housing, NMB 2012
- Ecological Assessment for Pelana Housing, Limpopo 2012
- Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape 2011
- Botanical Assessment for The Crags 288/03, Western Cape 2010
- Ecological Assessment Revision Report for Fairview Housing, NMB 2010

- Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape 2010
- Botanical Assessment for Little Ladywood, Western Cape 2010
- Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB 2010
- Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape 2010
- Botanical Assessment for Willow Tree Farm, NMB 2010
- Botanical Assessment for Kouga RDP Housing, Eastern Cape 2009
- Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB 2009
- Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape 2009
- Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay - 438/4, Western Cape 2009
- Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape 2008
- Site screening assessment for Greenbushes Site screening, NMB 2008
- Botanical Assessment for Fairfax development, Eastern Cape 2008
- Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape 2008
- Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB 2008
- Site Screening for Mount Road, NMB 2008
- Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB 2008
- Botanical Assessment for Greenbushes 130, NMB 2008
- Botanical Assessment for Greenbushes Kuyga no. 10, NMB 2008
- Botanical Assessment for Plettenberg Bay - 438/24, Western Cape 2007
- Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape 2007
- Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape 2006
- Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape 2006
- Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape 2006
- Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape 2006
- Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM 2006
- Botanical Assessment for Bosch Hoogte, NMB 2006
- Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape 2006
- Botanical Assessment for Plettenberg Bay - 444/27, Western Cape 2006
- Botanical Assessment for Leisure Homes, BCM, Eastern Cape 2006
- Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape 2005
- Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB 2005
- Botanical Assessment for Smart Stone, NMB 2005
- Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape 2005
- Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB 2005
- Basic Botanical Assessment for Parsonsvlei 3/4, Eastern Cape 2005
- Botanical Assessment for Bridgemead – Malabar PE, NMB 2004

AGRICULTURAL PROJECTS

- Preliminary Biodiversity Screening for Chrisdelina Ranch Agricultural Project, Kizenga District • 2020
- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse)2020 2020
- Thornhill Eggland Specialist Ecological Assessment 2020
- Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape 2015
- Ecological Assessment for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape 2014
- Ecological Assessment for Tzaneen Chicken Farm, Limpopo 2013
- Botanical Assessment and Open Space Management Plan for Kudukloof, NMB 2010

- Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB 2010
- Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB 2006

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

- Species List& Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape 2009
- Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape 2009
- Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape 2008
- Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Tiffendel Ski Resort, Eastern Cape 2006

MIXED USE DEVELOPMENT PROJECTS

- Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018
- Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB 2010
- Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB 2009
- Botanical Assessment and GIS maps for Utopia Estate PE, NMB 2008
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB 2007
- Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB 2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

- Ecological Assessment for Parsonsvlei Erf 984 & 1134 Parsonsvlei, NMB 2020
- Mthatha Retails and Service Center 2020
- Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB 2020
- Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB 2020
- Ecological Assessment for Bay West City ENGEN Service Station, NMB 2015
- Ecological Assessment for Green Star grading for SANRAL, NMB 2014
- Ecological Assessment for OTGC Tank Farm, NMB 2012
- Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB 2010
- Botanical Assessment for Bluewater Bay Erf 805, NMB 2009
- Ecological Assessment for Bay West City, NMB 2007
- Botanical Assessment for Kenton Petrol Station, Eastern Cape 2005
- Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB 2005

ECO-ESTATE DEVELOPMENT PROJECTS

- Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape 2018
- Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape 2010
- Botanical Assessment and EMP for Zwartenbosch Road, Eastern Cape 2010
- Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB 2008
- Botanical Assessment - Housing development for Coega Ridge, NMB 2008
- Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB, 2008
- Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape 2007
- Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape 2007
- Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape 2007
- Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape 2007
- Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape 2007
- Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB 2006

- Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape 2006
- Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape 2006
- Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape 2006
- Botanical Assessment for Rosehill Farm, Eastern Cape 2005
- Botanical Assessment for Resolution Game Farm, Eastern Cape 2005
- Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape 2005
- Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape 2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

- Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape 2020
- Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape 2019
- Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape 2019
- Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape 2018
- Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape 2018
- Flora Search and Rescue for Wilgekloof pipeline, Willowmore, Eastern Cape 2018
- Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5) 2016
- Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2016
- Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4) 2015
- Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB 2014
- Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape 2013
- Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3) 2013
- Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB 2013
- Flora and Fauna Search and Rescue for Jeffreys Bay School, Eastern Cape 2013
- Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape 2012
- Flora Relocation for Disco Poultry Farm, NMB 2010
- Flora Relocation for Mainstream Windfarm, Eastern Cape 2010

ENVIRONMENTAL MANAGEMENT PLANS

- Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandala Bay Municipality 2020
- Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality 2019
- Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape 2010
- Wetland Management Plan for NMB Portnet, NMB 2010
- Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape 2009
- Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape 2006
- EMP for Kromensee EMP (Jeffries Bay), Eastern Cape 2006
- Floral Survey for Mbotyi Conservation Assessment, Eastern Cape 2005
- Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape 2005

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

- Basic Assessment Application for Parsonsvlei Erf 984 & 1134 Parsonsvlei 2020
- Construction of Deviation and Rehabilitation of Bridge along DR02481 road 2020
- Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse) 2020

- Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development 2020
- Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10 2020
- Basic Assessment Application for Nelson Mandela University Access Road, NMB 2019
- Basic Assessment, WULA and Borrow Pit/Quarry Mining Application, Clarkebury Rd, Idutywa 2019

- Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay 2019
- Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation 2019
- Basic Assessment Application for Erf 14 Kabega, NMBM 2017
- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2017
- Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay 2017
- Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape 2015
- Basic Assessment Application for Hankey Housing, Kouga District Municipality 2015
- Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery) 2014
- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape– (SANRAL) 2019
- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL) 2018
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW) 2017
- Mining BAR/EMP's for Blue Crane Route & Camdeboo LM 12 Borrow Pits – (DoT) 2016
- Mining BAR/EMP's for Elundini LM 6 Borrow Pits (DoT) 2016
- Mining BAR/EMP's for Baviaans LM 6 Borrow Pits (DoT) 2016
- Mining BAR/EMP's for Kouga & Koukamma LM 12 Borrow Pits (DoT) 2016
- Mining BAR/EMP's for Sakhisizwe & Engcobo LM 12 Borrow Pits (DoT) 2016
- Mining BAR/EMP's for Senqu LM 12 Borrow Pits (DoT) 2016
- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL) 2016
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW) 2016
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits – Intsika Yethu and Emalahleni (DRPW) 2015
- Mining BAR/EMP's for Joe Gqabi DM Borrow Pits – Senqu (DRPW) 2015
- Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits – Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Amahlathi LM Borrow Pits – Amatole (DRPW) 2015
- Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits – Amatole (DRPW) 2015

- Mining BAR/EMP's for Sundays River Valley LM Borrow Pits – Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Kouga LM Borrow Pits – Sarah Baartman (DRPW) 2015
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW) 2014
- Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW) 2014
- Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 – Matatiele (DRPW) 2014

ENVIRONMENTAL COMPLIANCE AUDITING

- Environmental Compliance Audit (Habata Boerdery) 2021
- Environmental Compliance Audit (Sontule Farm) 2021

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

- Environmental Auditing Services Construction (Intsomi Citrus) 2021
- Environmental Auditing Services Pre-construction and Construction (Rocky Coast Farm) 2021
- Environmental Auditing Services (Middledrift Breeder Facility) 2021
- Coega Aquaculture Development Zone Environmental Compliance and Monitoring for Construction (24 Months) 2020
- Construction of NMU West End Student Residences Phases 1 & 3 Environmental Control Office (30 Months) 2020
- Environmental Auditing and construction monitoring for construction of Phase 1 River Park (South End Precinct) 2020
- Waste Management License audit for Bedford Recycling project 2020
- Auditing for Construction of Fairwest Village Housing Project 2019
- Auditing for Construction of Utopia Estate monthly auditing 2019
- ECO for DRPW IRM Road Maintenance projects, Baviaans LM 2019
- ECO for DRPW IRM Road Maintenance projects, Senqu LM 2019
- ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM 2019
- ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM 2019
- ECO for DRPW IRM Road Maintenance projects, Elundini LM 2019
- ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM 2019
- ECO for Construction of Fairwest Village Housing Project 2019
- ECO for Construction of Utopia Estate Mixed Use Project 2019
- ECO for Construction of NMU West End Student Residences Phases 1 & 3 2019
- ECO for Construction of Eco-Pullets pullet rearing facility, Paterson 2018
- ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM 2018
- ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgijima) LM 2018
- ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery) 2017
- ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts 2017
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2017
- ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL) 2016
- Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbashe LM 2016

- ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Mbizana LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Senqu LM 2016
- ECO for SANRAL RRP Road Maintenance projects, Elundini LM 2016
- ECO and Environmental Management for closure of Bushmans River Landfill site 2016
- ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality 2015
- ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's 2015
- ECO for Riversbend Citrus Farm, NMB 2014
- ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA 2014
- ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba 2014
- EMP and ECO for Utopia Estate, NMB 2013
- Final EMPr submission for Seaview Garden Estate, NMB 2012
- ECO audits for NMB Road surfacing, NMB (multiple contacts) 2011
- EMPr submission and ECO for Seaview Garden Estate, NMB 2010
- ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape 2010
- EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape 2009
- Flora Relocation Plan and Permit application for Wildemans Plaas, NMB 2006

ENVIRONMENTAL SCREENING PROJECTS

- Somerset East Stormwater Environmental Screening Report 2021
- Woodlands Diary Road Upgrade Environmental Screening Report, Kouga LM 2021
- Risk Assessment and Screening for proposed Heatherbank access road, NMB 2020
- Environmental Screening Report for Proposed Life Hospital parking expansion, NMB 2019
- Environmental Screening Report for Erf 984 & 1134 development, Parsonsvlei, NMB 2019
- Environmental Screening Report for proposed Khayalethu School, Buffalo City 2018
- Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB 2017
- Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB 2017
- Environmental Screening Report for Proposed Fairwest Social Housing project, Fairview, NMB 2016
- Environmental Screening Report for Development of Little Chelsea No 25, NMB 2016
- Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood) 2015
- Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth 2015
- Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe 2015
- Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth 2015
- Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate 2015
- Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB 2015

SECTION 24G APPLICATIONS

- 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust) 2015
- Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape 2015

CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. *Fuelwood harvesting and selection in Valley Thicket*, South Africa. Journal of Arid Environments, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. *The homegarden cultivation of indigenous medicinal plants in the Eastern Cape*. Indigenous Plant Use Forum, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. *The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage*. Working for Water Inaugural Research Symposium 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. *The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape*. Working for Water Inaugural Research Symposium 19 - 21 August 2003, Kirstenbosch, South Africa.

OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuis & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in Cyphia (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

# 7.9 Appendix H: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

**SCOPE**

The protocol (*Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020)*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation.

The protocol (*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted on 30 October 2020*), provides the criteria for the assessment and reporting of impacts on plant and animal species for activities requiring environmental authorisation.

These protocols replace the requirements of Appendix 6 of the Environmental Impact Assessment Regulation19.

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (https://screening.environment.gov.za/screeningtool). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute20.

**SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS**

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken using:
    a. a desk top analysis, using satellite imagery,
    b. a preliminary on-site inspection; and
    c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
    a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc.
    b. contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity; and

19 The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

20 The biodiversity dataset has been provided by the South African National Biodiversity Institute (for details of the dataset, click on the options button to the right of the various biodiversity layers on ther screening tool).

c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

**TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 1 | General Information | |
| 1.1 | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment. | ✓ |
| 1.2 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being 'low sensitivity' for terrestrial biodiversity, must submit a Terrestrial Biodiversity Compliance Statement. | ✓ |
| 1.3 | However, where the information gathered from the site sensitivity verification differs from the designation of 'very high' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a 'low' sensitivity, then a Terrestrial Biodiversity Compliance Statement must be submitted. | ✓ |
| 1.4 | Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a 'low' terrestrial biodiversity sensitivity on the screening tool, a Terrestrial Biodiversity Specialist Assessment must be conducted. | ✓ |
| 1.5 | If any part of the proposed development footprint falls within an area of 'very high' sensitivity, the assessment and reporting requirements prescribed for the 'very high' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed. | ✓ |
| | VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features | |
| 2 | Terrestrial Biodiversity Specialist Assessment | |
| 2.1 | The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with expertise in the field of terrestrial biodiversity. | ✓ |
| 2.2 | The assessment must be undertaken on the preferred site and within the proposed development footprint. | ✓ |
| 2.3 | The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects: | ✓ |

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 2.3.1 | a description of the ecological drivers or processes of the system and how the proposed development with impact these; | ✓ |
| 2.3.2 | ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site; | ✓ |
| 2.3.3 | the ecological corridors that the proposed development would impede including migration and movement of flora and fauna; | ✓ |
| 2.3.4 | the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments); | ✓ |
| 2.3.5 | a description of terrestrial biodiversity and ecosystems on the preferred site, including: | ✓ |
| (a) | main vegetation types; | ✓ |
| (b) | threatened ecosystems, including fisted ecosystems as well as locally important habitat types identified; | ✓ |
| (c) | ecological connectivity, habitat fragmentation, ecological processes and fine- scale habitats; and | ✓ |
| (d) | species, distribution, important habitats (e.g., feeding grounds, nesting sites, etc.) and movement patterns identified; | ✓ |
| 2.3.6 | the assessment must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and | ✓ |
| 2.3.7 | the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify: | ✓ |
| 2.3.7.1 | terrestrial critical biodiversity areas (CBAs), including: | ✓ |
| (a) | the reasons why an area has been identified as a CBA; | ✓ |
| (b) | an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation; | ✓ |
| (c) | the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s); | ✓ |
| (d) | the impact on ecosystem threat status; | ✓ |
| (e) | the impact on explicit subtypes in the vegetation; | ✓ |
| (f) | the impact on overall species and ecosystem diversity of the site; and | ✓ |
| (g) | the impact on any changes to threat status of populations of species of conservation concern in the CBA; | ✓ |
| 2.3.7.2 | terrestrial ecological support areas (ESAs), including: | ✓ |
| (a) | the impact on the ecological processes that operate within or across the site; | ✓ |
| (b) | the extent the proposed development will impact on the functionality of the ESA; and | ✓ |

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| (c) | loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration \| and movement of flora and fauna; | ✓ |
| 2.3.7.3 | protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including | ✓ |
| (a) | an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan; | ✓ |
| 2.3.7.4 | priority areas for protected area expansion, including- | ✓ |
| (a) | the way in which in which the proposed development will compromise or contribute to the expansion of the protected area I network; | ✓ |
| 2.3.7.5 | Strategic Water Source Areas (SWSAs) including: | ✓ |
| (a) | the impact(s) on the terrestrial habitat of SWSA; and | ✓ |
| (b) | the impacts of the proposed development on the SWSA water quality and quantity (e.g., describing potential increased runoff leading to increased sediment load in water courses), | ✓ |
| 2.3.7.6 | FEPA sub catchments, including- | ✓ |
| (a) | the impacts of the proposed development on habitat condition and species in the FEPA sub catchment; | ✓ |
| 2.3.7.7 | indigenous forests, including: | ✓ |
| (a) | impact on the ecological integrity of the forest and | ✓ |
| (b) | percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas. | ✓ |
| 2.4 | The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report | ✓ |
| 3 | Terrestrial Biodiversity Specialist Assessment Report | |
| 3.1 | The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information: | ✓ |
| 3.1.1 | contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; | ✓ |
| 3.1.2 | a signed statement of independence by the specialist; | ✓ |
| 3.1.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment, | ✓ |
| 3.1.4 | description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant; | ✓ |
| 3.1.5 | a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations; | ✓ |
| 3.1.6 | a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant); | ✓ |
| 3.1.7 | additional environmental impacts expected from the proposed development; | ✓ |

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 3.1.8 | any direct, indirect, and cumulative impacts of the proposed development; | ✓ |
| 3.1.9 | the degree to which impacts, and risks can be mitigated; | ✓ |
| 3.1.10 | the degree to which the impacts and risks can be reversed; | ✓ |
| 3.1.11 | the degree to which the impacts and risks can cause loss of irreplaceable resources; | ✓ |
| 3.1.12 | proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr), | ✓ |
| 3.1.13 | a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate, | ✓ |
| 3.1.14 | a substantiated statement based on the findings of the specialist assessment, regarding the acceptability, or not. of the proposed development if it should receive approval a not; and | ✓ |
| 3.1.15 | any conditions to which this statement is subjected. | ✓ |
| 3.2 | The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant. | ✓ |
| 3.3 | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | ✓ |
| | LOW SENSITIVITY RATING – for terrestrial biodiversity features | |
| 4 | Terrestrial Biodiversity Compliance Statement | ✓ |
| 4.1 | The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences. | ✓ |
| 4.2 | The compliance statement must: | ✓ |
| 4.2.1 | be applicable to the preferred site and proposed development footprint; | ✓ |
| 4.2.2 | confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and | ✓ |
| 4.2.3 | indicate whether or not the proposed development will have any impact on the biodiversity feature. | ✓ |
| 4.3 | The compliance statement must contain, as a minimum, the following information: | ✓ |
| 4.3.1 | the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; | ✓ |
| 4.3.2 | a signed statement of independence by the specialist; | ✓ |
| 4.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | ✓ |
| 4.3.4 | a baseline profile description of biodiversity and ecosystems of the site; | ✓ |
| 4.3.5 | the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant; | ✓ |

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 4.3.6 | in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures propped, the land can be returned to the current state within two years of completion of the construction phase; | ✓ |
| 4.3.7 | where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr; | ✓ |
| 4.3.8 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; and | ✓ |
| 4.3.9 | any conditions to which this statement is subjected. | ✓ |
| 4.4 | A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | ✓ |

**ANIMAL SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 1 | General Information | |
| 1.1 | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "very high" or "high" sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Specialist Assessment Report. | ✓ |
| 1.2 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "medium sensitivity" for terrestrial animal species must submit either a Terrestrial Animal Species Specialist Assessment Report or a Terrestrial Animal Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | ✓ |
| 1.3 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "low" sensitivity for terrestrial animal species must submit a Terrestrial Animal Species Compliance Statement. | ✓ |
| 1.4 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of "very high" or "high", for terrestrial animal species sensitivity and it is found to be of a "low" sensitivity, then a Terrestrial Animal Species Compliance Statement must be submitted. | ✓ |
| 1.5 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of "low" terrestrial animal species sensitivity and it is found to be of a "very high" or "high" terrestrial animal species sensitivity, a Terrestrial Animal Species Specialist Assessment must be conducted. | ✓ |
| 1.6 | If any part of the development falls within an area of confirmed "very high" or "high" sensitivity, the assessment and reporting requirements prescribed for the "very high" or "high" sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the | ✓ |

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| | area on which the proposed development will take place and includes the area that will be disturbed or impacted. | |
| 1.7 | The Terrestrial Animal Species Specialist Assessment and the Terrestrial Animal Species Compliance Statement must be undertaken within the study area. | ✓ |
| 1.8 | Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site. | ✓ |
| 1.9 | Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline21, and the study area must include the PAOI, as determined. | ✓ |
| | VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial animal species | |
| 2 | Terrestrial Animal Species Specialist Assessment | ✓ |
| | VERY HIGH SENSITIVITY RATING<br>Critical habitat for range-restricted species22 of conservation concern, that have a global range of less than 10 km2.<br>SCC listed on the IUCN Red List of Threatened Species23 or on South Africa's National Red List website24 as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.<br>Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.<br>The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.<br>These areas are irreplaceable for SCC.<br>**HIGH SENSITIVITY RATING**<br>Confirmed habitat for SCC.<br>SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.<br>These areas are unsuitable for development due to a very likely impact on SCC. | ✓ |
| 2.1 | The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with a | ✓ |

21 Available at https://bgis.sanbi.org/
22 Species with a geographically restricted area of distribution.
23 https://www.iucnredlist.org/
24 This category includes the categories Extremely Rare, Critically Rare, and Rare

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| | field of practical experience relevant to the taxonomic group ("taxa") for which the assessment is being undertaken. | |
| 2.2 | The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline25; and must: | ✓ |
| 2.2.1 | identify the SCC which were found, observed or are likely to occur within the study area; | ✓ |
| 2.2.2 | provide evidence (photographs or sound recordings) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility26, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3); | ✓ |
| 2.2.3 | identify the distribution, location, viability27 and provide a detailed description of population size of the SCC, identified within the study area; | ✓ |
| 2.2.4 | identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area; | ✓ |
| 2.2.5 | determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases; | ✓ |
| 2.2.6 | determine the potential impact of the proposed development on the habitat of the SCC located within the study area; | ✓ |
| 2.2.7 | include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation; | ✓ |
| 2.2.8 | identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems; | ✓ |
| 2.2.9 | identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability; | ✓ |
| 2.2.10 | determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC; | ✓ |
| 2.2.11 | discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species28; or roosting and | ✓ |

25 Available at https://bgis.sanbi.org/
26 The preferred platform is iNaturalist.org but any other national or international virtual museum.
27 the ability to survive and reproduce in the long term.
28 Undescribed species are to be assessed as "High Sensitivity".

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| | breeding or foraging areas used by migratory species where these species show significant congregations, occurring in the vicinity; and | |
| 2.2.12 | identify any alternative development footprints within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification. | ✓ |
| 2.3 | The findings of the assessment must be written up in a Terrestrial Animal Species Specialist Assessment Report. | ✓ |
| 3 | Terrestrial Animal Species Specialist Assessment Report | ✓ |
| 3.1 | This report must include as a minimum the following information: | ✓ |
| 3.1.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae; | ✓ |
| 3.1.2 | a signed statement of independence by the specialist; | ✓ |
| 3.1.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | ✓ |
| 3.1.4 | a description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant; | ✓ |
| 3.1.5 | a description of the mean density of observations/number of sample sites per unit area29 and the site inspection observations; | ✓ |
| 3.1.6 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; | ✓ |
| 3.1.7 | details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported30; | ✓ |
| 3.1.8 | the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area; | ✓ |
| 3.1.9 | the location of areas not suitable for development and to be avoided during construction where relevant; | ✓ |
| 3.1.10 | a discussion on the cumulative impacts; | ✓ |
| 3.1.11 | impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr); | ✓ |
| 3.1.12 | a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and | ✓ |
| 3.1.13 | a motivation must be provided if there were any development footprints identified as per paragraph 2.2.12 above that were identified as having "low" | ✓ |

29 Species Environmental Assessment Guideline

30 The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| | or "medium" terrestrial animal species sensitivity and were not considered appropriate. | |
| 3.2 | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | ✓ |
| 4 | MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION | |
| | MEDIUM SENSITIVITY RATING – for terrestrial animal species:<br>Suspected habitat for SCC based either on historical records (prior to 2002) or being a natural area included in a habitat suitability model for this species31.<br>SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. | ✓ |
| 4.1 | Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling. | ✓ |
| 4.2 | The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken. | ✓ |
| 4.3 | The assessment must be undertaken within the study area. | ✓ |
| 4.4 | The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guidelines. | ✓ |
| 4.5 | The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as "medium" sensitivity by the screening tool. | ✓ |
| 4.6 | Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol. | ✓ |
| 4.7 | Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Animal Species Compliance Statement must be submitted. | ✓ |
| 5 | LOW SENSITIVITY RATING – for terrestrial animal species | |
| | Terrestrial Animal Species Compliance Statement<br>Areas where no natural habitat remains.<br>Natural areas where there is no suspected occurrence of SCC. | ✓ |

31 The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 5.1 | The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Zoological Science or Ecological Science). | ✓ |
| 5.2 | The compliance statement must: | ✓ |
| 5.2.1 | be applicable to the study area; | ✓ |
| 5.2.2 | confirm that the study area, is of "low" sensitivity for terrestrial animal species; and | ✓ |
| 5.2.3 | indicate whether or not the proposed development will have any impact on SCC. | ✓ |
| 5.3 | The compliance statement32 must contain, as a minimum, the following information: | ✓ |
| 5.3.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae; | ✓ |
| 5.3.2 | a signed statement of independence by the specialist; | ✓ |
| 5.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | ✓ |
| 5.3.4 | a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant; | ✓ |
| 5.3.5 | the mean density of observations/ number of samples sites per unit area. | ✓ |
| 5.3.6 | where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr; | ✓ |
| 5.3.7 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; and | ✓ |
| 5.3.8 | any conditions to which the compliance statement is subjected. | ✓ |
| 6 | A signed copy of the Terrestrial Animal Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report. | ✓ |

**PLANT SPECIES SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS**

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 1 | General Information | |
| 1.1 | An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified by the screening tool as being of "very high" or "high" sensitivity for terrestrial plant species must submit a Terrestrial Plant Species Specialist Assessment Report. | ✓ |
| 1.2 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "medium | ✓ |

32 An example of a what is contained in a Compliance Statement for Animal Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| | sensitivity" for terrestrial plant species must submit either a Terrestrial Plant Species Specialist Assessment Report or a Terrestrial Plant Species Compliance Statement, depending on the outcome of a site inspection undertaken in accordance with paragraph 4. | |
| 1.3 | An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of "low" sensitivity for terrestrial plant species must submit a Terrestrial Plant Species Compliance Statement. | ✓ |
| 1.4 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of "very high" or "high", for terrestrial plant species sensitivity and it is found to be of a "low" sensitivity, then a Terrestrial Plant Species Compliance Statement must be submitted. | ✓ |
| 1.5 | Where the information gathered from the site sensitivity verification differs from the screening tool designation of "low" terrestrial plant species sensitivity and it is found to be of a "very high" or "high" terrestrial plant species sensitivity, a Terrestrial Plant Species Specialist Assessment must be conducted. | ✓ |
| 1.6 | If any part of the development falls within an area of confirmed "very high" or "high" sensitivity, the assessment and reporting requirements prescribed for the "very high" or "high" sensitivity, apply to the entire development footprint. Development footprint in the context of this protocol means, the area on which the proposed development will take place and includes the area that will be disturbed or impacted. | ✓ |
| 1.7 | The Terrestrial Plant Species Specialist Assessment and the Terrestrial Plant Species Compliance Statement must be undertaken within the study area. | ✓ |
| 1.8 | Where the nature of the activity is not expected to have an impact on species of conservation concern (SCC) beyond the boundary of the preferred site, the study area means the proposed development footprint within the preferred site. | ✓ |
| 1.9 | Where the nature of the activity is expected to have an impact on SCC beyond the boundary of the preferred site, the project areas of influence (PAOI) must be determined by the specialist in accordance with Species Environmental Assessment Guideline33, and the study area must include the PAOI, as determined. | ✓ |
| | VERY HIGH AND HIGH SENSITIVITY RATING for terrestrial plant species | |
| 2 | Terrestrial Plant Species Specialist Assessment | ✓ |
| | VERY HIGH SENSITIVITY RATING<br>Critical habitat for range-restricted species34 of conservation concern, that have a global range of less than 10 km2. | ✓ |

33 Available at https://bgis.sanbi.org/
34 Species with a geographically restricted area of distribution.

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| | SCC listed on the IUCN Red List of Threatened Species35 or on South Africa's National Red List website36 as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria or listed as Nationally Rare.<br>Species aggregations that represent ≥1% of the global population size of a species, over a season, and during one or more key stages of its life cycle.<br>The number of mature individuals that ranks the site among the largest 10 aggregations known for the species.<br>These areas are irreplaceable for SCC.<br>**HIGH SENSITIVITY RATING**<br>Confirmed habitat for SCC.<br>SCC, listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable, according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare.<br>These areas are unsuitable for development due to a very likely impact on SCC. | |
| 2.1 | The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP) with a field of practical experience relevant to the taxonomic group ("taxa") for which the assessment is being undertaken. | ✓ |
| 2.2 | The assessment must be undertaken within the study area. | ✓ |
| 2.3 | The assessment must be undertaken in accordance with the Species Environmental Assessment Guideline37; and must: | ✓ |
| 2.3.1 | Identify the SCC which were found, observed or are likely to occur within the study area; | ✓ |
| 2.3.2 | provide evidence (photographs) of each SCC found or observed within the study area, which must be disseminated by the specialist to a recognized online database facility38, immediately after the site inspection has been performed (prior to preparing the report contemplated in paragraph 3); | ✓ |
| 2.3.3 | identify the distribution, location, viability39 and provide a detailed description of population size of the SCC, identified within the study area; | ✓ |
| 2.3.4 | identify the nature and the extent of the potential impact of the proposed development on the population of the SCC located within the study area; | ✓ |
| 2.3.5 | determine the importance of the conservation of the population of the SCC identified within the study area, based on information available in national and international databases, including the IUCN Red List of Threatened Species, South African Red List of Species, and/or other relevant databases; | ✓ |

35 https://www.iucnredlist.org/
36 This category includes the categories Extremely Rare, Critically Rare, and Rare
37 Available at https://bgis.sanbi.org/
38 The preferred platform is iNaturalist.org but any other national or international virtual museum.
39 the ability to survive and reproduce in the long term.

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 2.3.6 | determine the potential impact of the proposed development on the habitat of the SCC located within the study area; | ✓ |
| 2.3.7 | include a review of relevant literature on the population size of the SCC, the conservation interventions as well as any national or provincial species management plans for the SCC. This review must provide information on the need to conserve the SCC and indicate whether the development is compliant with the applicable species management plans and if not, include a motivation for the deviation; | ✓ |
| 2.3.8 | identify any dynamic ecological processes occurring within the broader landscape that might be disrupted by the development and result in negative impact on the identified SCC, for example, fires in fire-prone systems; | ✓ |
| 2.3.9 | identify any potential impact of ecological connectivity in relation to the broader landscape, resulting in impacts on the identified SCC and its long-term viability; | ✓ |
| 2.3.10 | determine buffer distances as per the Species Environmental Assessment Guidelines used for the population of each SCC; | ✓ |
| 2.3.11 | discuss the presence or likelihood of additional SCC including threatened species not identified by the screening tool, Data Deficient or Near Threatened Species, as well as any undescribed species40; | ✓ |
| 2.3.12 | identify any alternative development footprints within the preferred site which would be of "low" or "medium" sensitivity as identified by the screening tool and verified through the site sensitivity verification. | ✓ |
| 2.4 | The findings of the assessment must be written up in a Terrestrial Plant Species Specialist Assessment Report. | ✓ |
| 3 | Terrestrial Plant Species Specialist Assessment Report | ✓ |
| 3.1 | This report must include as a minimum the following information: | ✓ |
| 3.1.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae; | ✓ |
| 3.1.2 | a signed statement of independence by the specialist; | ✓ |
| 3.1.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | ✓ |
| 3.1.4 | a description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant; | ✓ |
| 3.1.5 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; | ✓ |
| 3.1.6 | a description of the mean density of observations/number of sample sites per unit area41 and the site inspection observations; | ✓ |

40 Undescribed species are to be assessed as "High Sensitivity".
41 Species Environmental Assessment Guideline

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 3.1.7 | details of all SCC found or suspected to occur on site, ensuring sensitive species42 are appropriately reported; | ✓ |
| 3.1.8 | the online database name, hyperlink, and record accession numbers for disseminated evidence of SCC found within the study area; | ✓ |
| 3.1.9 | the location of areas not suitable for development and to be avoided during construction where relevant; | ✓ |
| 3.1.10 | a discussion on the cumulative impacts; | ✓ |
| 3.1.11 | impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr); | ✓ |
| 3.1.12 | a reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and | ✓ |
| 3.1.13 | a motivation must be provided if there were any development footprints identified as per paragraph 2.3.12 above that were identified as having "low" or "medium" terrestrial plant species sensitivity and were not considered appropriate. | ✓ |
| 3.2 | A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report. | ✓ |
| 4 | MEDIUM SENSITIVITY SPECIES OF CONSERVATION CONCERN CONFIRMATION | |
| | MEDIUM SENSITIVITY RATING – for terrestrial plant species:<br>Suspected habitat for SCC based either on there being records for this species collected in the past, prior to 2002, or being a natural area included in a habitat suitability model43.<br>SCC listed on the IUCN Red List of Threatened Species or South Africa's National Red List website as Critically Endangered, Endangered or Vulnerable according to the IUCN Red List 3.1. Categories and Criteria and under the national category of Rare. | ✓ |
| 4.1 | Medium sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling. | ✓ |
| 4.2 | The presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection by a specialist registered with the SACNASP with a field of practice relevant to the taxonomic groups ("taxa") for which the assessment is being undertaken. | ✓ |

42 The actual name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as a sensitive plant or animal and its IUCN extinction risk category should be included e.g., Critically Endangered sensitive plant or Endangered sensitive butterfly.

43 The methodology by which habitat suitability models have been developed are explained within the Species Environmental Assessment Guideline.

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 4.3 | The assessment must be undertaken within the study area. | ✓ |
| 4.4 | The site inspection to determine the presence or likely presence of SCC must be undertaken in accordance with the Species Environmental Assessment Guidelines. | ✓ |
| 4.5 | The site inspection is to confirm the presence, likely presence or confirmed absence of a SCC identified within the site identified as "medium" sensitivity by the screening tool. | ✓ |
| 4.6 | Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol. | ✓ |
| 4.7 | Similarly, where no SCC are found on site during the site inspection or the presence is confirmed to be unlikely, a Terrestrial Plant Species Compliance Statement must be submitted. | ✓ |
| 5 | LOW SENSITIVITY RATING – for terrestrial plant species | |
| | Terrestrial Plant Species Compliance Statement<br>Areas where no natural habitat remains.<br>Natural areas where there is no suspected occurrence of SCC. | ✓ |
| 5.1 | The compliance statement must be prepared by a SACNASP registered specialist under one of the two fields of practice (Botanical Science or Ecological Science). | ✓ |
| 5.2 | The compliance statement must: | ✓ |
| 5.2.1 | be applicable to the study area; | ✓ |
| 5.2.2 | confirm that the study area, is of "low" sensitivity for terrestrial plant species; and | ✓ |
| 5.2.3 | indicate whether or not the proposed development will have any impact on SCC. | ✓ |
| 5.3 | The compliance statement44 must contain, as a minimum, the following information: | ✓ |
| 5.3.1 | contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the compliance statement including a curriculum vitae; | ✓ |
| 5.3.2 | a signed statement of independence by the specialist; | ✓ |
| 5.3.3 | a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | ✓ |
| 5.3.4 | a description of the methodology used to undertake the site survey and prepare the compliance statement, including equipment and modelling used where relevant; | ✓ |
| 5.3.5 | where required, proposed impact management actions and outcomes or any monitoring requirements for inclusion in the EMPr; | ✓ |

44 An example of a what is contained in a Compliance Statement for Plant Species Impact Assessment can be found in the Species Environmental Impact Assessment Guideline

| TABLE 1: | ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY | REPORT REFERENCE |
|---|---|---|
| 5.3.6 | a description of the assumptions made and any uncertainties or gaps in knowledge or data; | ✓ |
| 5.3.7 | the mean density of observations/ number of samples sites per unit area45; and | ✓ |
| 5.3.8 | any conditions to which the compliance statement is subjected. | ✓ |
| 6 | A signed copy of the Terrestrial Plant Species Compliance Statement must be appended to the Basic Assessment Report or the Environmental Impact Assessment Report. | ✓ |

45 Refer to the Species Environmental Assessment Guideline

# 7.10 Appendix I: Site Sensitivity Verification Report

## 7.10.1 Purpose of Report

The "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24 (5) (a) and (h) and 44 of the Act, when applying for Environmental Authorisation*", as published on 20 March, 2020 in National Gazette, No. 43110 in terms of NEMA (Act 107 of 1998) sections 24(5)(a), (h) and 44, lists protocols and minimum report requirements for environmental impacts on terrestrial biodiversity and provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the National web based Environmental Screening Tool. Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a **site sensitivity verification**, which must include the following.

1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.
2. The site sensitivity verification must be undertaken through the use of:
    a. a desk top analysis, using satellite imagery.
    b. a preliminary on -site inspection; and
    c. any other available and relevant information.
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:
    a. confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool.
    b. contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
    c. is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The National Web Based Screening Tool was used to generate the potential environmental sensitivity of the site which has then been compared to various online and other databases and information sources in order to verify and confirm the validity of the screening tool findings. This was further supported with on-site observations and analysis of most recent aerial photography.

This terrestrial biodiversity site verification has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

## 7.10.2 Data sources and references

Data sources that were utilised for this report include the following:

- National (DFFE) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.

- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI.)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species.
- Animal Demography Unit Virtual Museum (VM) – potential faunal species.
- Global Biodiversity Information Facility (GBIF) – potential faunal species.
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records.
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies.
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments.
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information.
- Bioregional Planning: Northwest Biodiversity Sector Plan (2015).
- Critical Biodiversity Areas of the Northern Cape (2016) – Bioregional Plan.
- SANBI BGIS – All other biodiversity GIS datasets.
- Aerial Imagery – Google Earth, ESRI, Chief Surveyor General (http://csg.dla.gov.za).
- Cadastral and other topographical country data - Chief Surveyor General (http://csg.dla.gov.za).
- Other sources include peer-reviewed journals, regional and local assessments, and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

### 7.10.3 Site visit

A preliminary site verification for screening purposes was conducted between 25 and 28 April 2023. This initial site visit did not include any detailed habitat or species assessments, the purpose being to obtain an overview of the site only and to identify possible risks to the proposed activity and undertake preliminary habitat mapping. A follow up site visit was conducted between 24 & 26 May 2023 in order to supplement the initial findings, undertake further species surveys as well as refine sensitivity mapping.

### 7.10.4 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report and have been undertaken by an aquatic specialist.
- No specific faunal assessment has been undertaken, but animals have been assessed in term of the terrestrial Biodiversity Assessment requirements.
- Any flora surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times.
- As far as possible, site collected data has been supplemented with desktop and database-centred distribution data as well as previous studies undertaken in the area.

### 7.10.5 Site and Activity Description

The site is situated between **Beaufort West to the north-west and Aberdeen to the south-east, in the Eastern Cape** province, with the FE Tango Wind Energy Facility site lying to the east, slightly north of the

R61 district road. The site is situated within a commercial livestock and game farming area (Refer to Figure 1), generally comprising dryland grazing. The portion assessed is approximately 2 250 Ha in extent. The area falls within a low, predominantly summer rainfall area.

## 7.10.6 National Environmental Screening Tool

The DFFE National Environmental Screening Tool indicates the following:

- Terrestrial Biodiversity – Very High & Low
- Animal Species – High, Medium, & Low
- Plant Species – Medium & Low
- Aquatic Biodiversity – Very High & Low

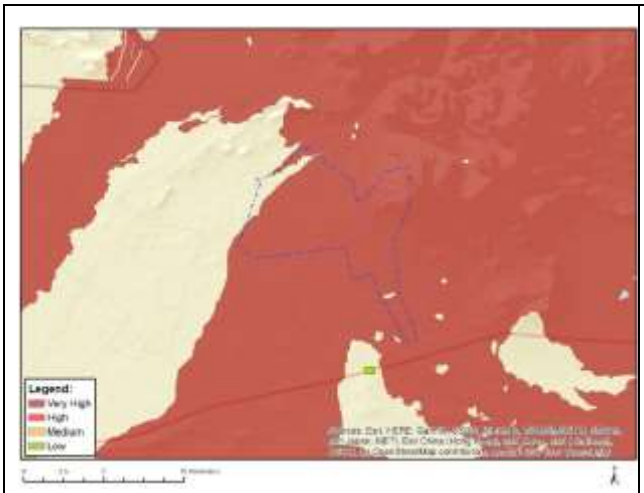


*Figure 19: Terrestrial Biodiversity Sensitivity*

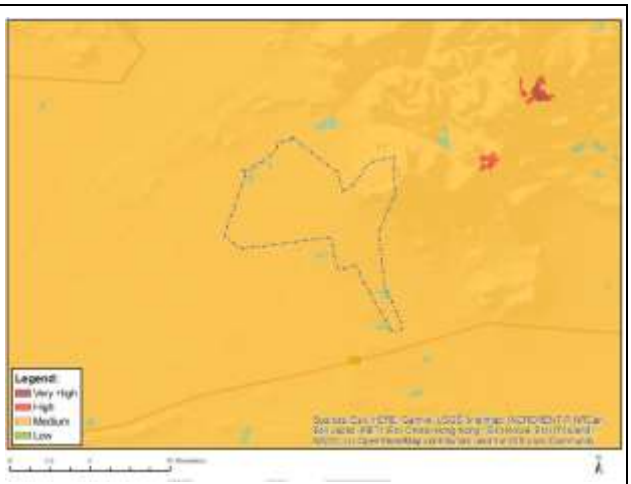


*Figure 20: Plant Species Sensitivity*


*Figure 21: Animal Species Sensitivity*

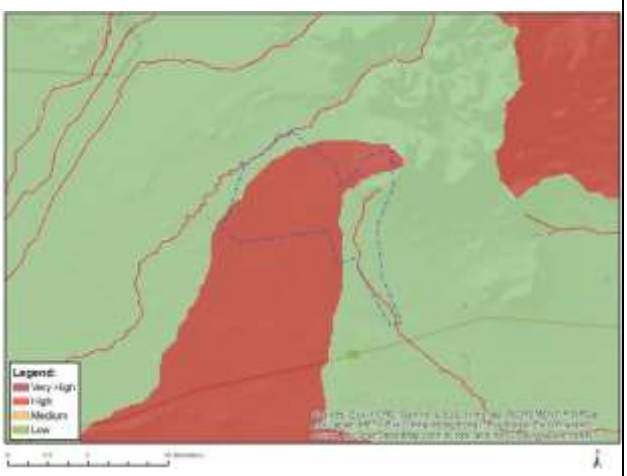


*Figure 22: Aquatic Sensitivity*

| SENSITIVITY | DESCRIPTION - FEATURE(S) IN PROXIMITY |
|---|---|
| **Terrestrial Sensitivity** | |
| Very High | CBA 2, ESA 1 & 2, FEPA sub-catchments |
| High | None |
| Medium | None |
| Low | Present |
| **Plant Sensitivity** | |
| Very High | None |
| High | None |

| SENSITIVITY | DESCRIPTION - FEATURE(S) IN PROXIMITY |
|---|---|
| Medium | Sensitive species 1212 & 1039, *Peersia frithii, Tridentea virescens, Cliffortia montana, Dierama grandiflorum, Erica passerinoides* |
| Low | Present |
| **Animal Sensitivity** | |
| Very High | *None* |
| High | *Aquila verreauxii, Polemaetus bellicosus, Neotis ludwigii, Afrotis afra, Circus maurus* (Birds) |
| Medium | *Neotis ludwigii, Ciconia nigra, Circus maurus* (Birds) & *Chersobius boulengeri* (reptile) |
| Low | Present |
| **Aquatic Sensitivity** | |
| Very High | Rivers & Wetlands, FEPA quinary catchments |
| High | None |
| Medium | None |
| Low | Present |

The following is deduced from the DFFE National Environmental Screening Tool:

- As apparent from the National Environmental Screening Tool, the terrestrial biodiversity theme is Very High.
- Several flora (plant) species regarded as being of concern are flagged and will be assessed further in the report, however none were found to be present during the site visit and are furthermore not deemed likely to be present, as the site is outside of the known range.
- Faunal (animal) species regarded as being of concern is flagged. This species is confirmed to not be present, supported by the fact that suitable habitat is not present.
- The aquatic sensitivity is Very High, supported by on site observations. Refer to separate aquatic assessment for specific findings outside the scope of this terrestrial biodiversity assessment.
- The terrestrial flora and fauna impacts are assessed further in the relevant report sections for flora and fauna in the accompanying report.

The site assessment has physically screened for the presence of any species as listed in the National Environmental Screening Tool, as well as other possible species or sensitivities that are not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

## 7.10.7 Findings, Outcomes and Recommendations

### *Terrestrial Biodiversity*

Site verification of the Terrestrial Biodiversity sensitivities is summarised in *Table 13* and depicted in Figure 23. Designated Critical Biodiversity Area or Ecological Support Area intersect with the site or project area.

*Table 13: Terrestrial Biodiversity Features.*

| Feature | | COMMENT |
|---|---|---|
| Critical Biodiversity Area | Present | CBA 2 is present overlapping a portion of the site. |
| Ecological Support Area | Present | ESA 1 is present overlapping a portion of the site. |

Based on the confirmed habitat and the field surveys, the classification of VERY HIGH sensitivity for Terrestrial Biodiversity according to the Screening Tool is partially supported, as the verified sensitivity

is VERY HIGH for portions of the site, but fine scale mapping has reduced the overall sensitive area with portions designated LOW Sensitivity.

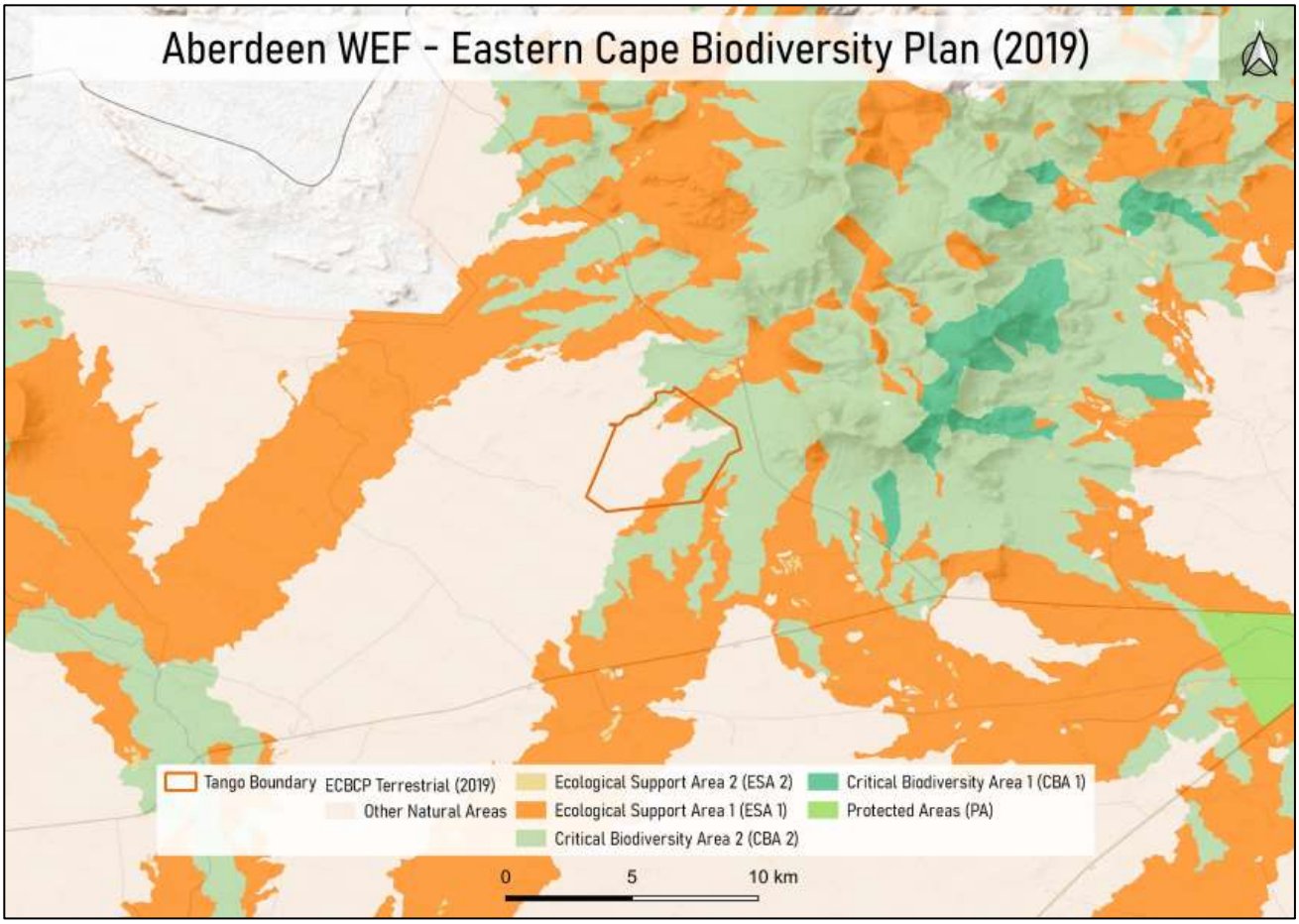


*Figure 23: Map indicating Eastern Cape Biodiversity Conservation Plan (ECBCP).*

## *Plant Species (Flora)*

National Environmental Screening Tool flagged several flora species. None were found to occur along within the site at the time of assessment. Construction of the WEF is unlikely to pose any risk of significance to the flagged species due to the limited impact and footprint.

Based on the confirmed habitat and the field surveys, the classification of MEDIUM sensitivity for Plant Species according to the Screening Tool is not supported, as the verified sensitivity is LOW due to none of the species flagged being found to be present.

## *Animal Species (Fauna)*

A reptile species is listed in the screening tool; however, the preferred habitat for this species is not considered to be abundant within the site. Refer to Avifaunal report regarding bird species.

Based on the confirmed habitat and the field surveys, the classification of MEDIUM sensitivity for Animal Species (excluding Avifauna) according to the Screening Tool is not supported, as the verified sensitivity is LOW due to suitable habitat nor the habitat specific species not being present.

*Aquatic*

Wetland and River features are present in the broader area. Refer to Aquatic assessment report regarding aquatic aspects.

Based on the confirmed habitat and the field surveys, the classification of HIGH sensitivity for Aquatic Sensitivity according to the Screening Tool is partially supported, as the verified sensitivity is VERY HIGH for portions of the site, but fine scale mapping has reduced the overall sensitive area with portions designated LOW Sensitivity.

## 7.10.8 Conclusions

The site verification thus confirms that a portion of the site overlaps with designated terrestrial Critical Biodiversity and Ecological Support Areas, associated with broader landscape level ecological processes and conservation priorities of the affected vegetation units. It further confirms that the listed plant species were not recorded at the time of assessment.

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